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THE CALIFORNIA STRAWBERRY INDUSTRY

Changing Economic and Marketing Relationships

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THE CALIFORNIA STRAWBERRY INDUSTRY--
CHANGING ECONOMIC AND MARKETING RELATIONSHIPS

by

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I. Introduction

California has played a leading role in the two dramatic changes that have taken place in the United States strawberry industry in the postwar years. These important developments have been (1) the growth in importance of the Pacific Coast in the production of strawberries, with the greatest increase found in California, and (2) the shift in utilization of the strawberry crop, with a larger percentage (in some years more than 50 percent) of the national production going into processing (largely frozen strawberries, of course) and California gaining the position of one of the country's leading processors. The latter change, with the striking development of the importance of the frozen strawberry segment of the industry, means a change in strawberries from a seasonal fresh product for more or less special use to a year-round product for general consumption.

Strawberries in the Prewar Period

In the years before World War II, the strawberry industry was characterized by factors which were largely a product of peculiarities of the crop. The strawberry was a seasonal product--marked by perishability--subject to striking variations caused by climatic changes and a "sideline" cash crop, adaptable as a "one family" small-acreage operation requiring a large amount of hand labor and little expensive equipment. Since perishability of the product was of great importance, transportation and cold storage facilities played a large role; a large percentage of the crop was thus sent to fresh market--locally, if possible. Since favorable climatic conditions are important for commercial production, the areas of production were not necessarily found near major markets, thus giving importance to locational and transportation factors.

The strawberry is possibly the most widely grown small fruit in the United States. It is grown as a "home crop," but, in addition, many localities grow strawberries for market throughout the United States. However, the major sources of commercial production have been, in the main, spread among approximately 31 states scattered across the nation. The most important pattern, therefore,

is a seasonal one; and, in such a complex national market, it is convenient and also economically meaningful to consider the various producing states in their major seasonal groupings. These groupings are winter (January, February, and March), early spring (April), midspring (May), and late spring (June). (See Figure 1.)

Seasonal Nature of the Strawberry Harvest

The strawberry calendar is characterized by a usual harvesting season and a peak harvest period based almost exclusively on geographical location and climatic conditions but partially determined, in addition, by the variety of strawberry grown.

Winter area--Florida

Early spring area--mainly Louisiana, Alabama, and Texas.

Midspring area--mainly Arkansas, Tennessee, Missouri, Kentucky, Virginia, Oklahoma, Maryland, Kansas, North Carolina, Illinois, and California (shown separately).

Late spring area--mainly Michigan, New York, Wisconsin, New Jersey, Indiana, Ohio, Pennsylvania, Oregon, and Washington.

California has a unique position on this calendar, as will be discussed more at length later, because of her unusually long season with an early spring peak period in southern California and at least two peak periods in northern California--the first and largest in midspring and a late one at the end of the summer.

Strawberry Varieties

The large number and continuing development of new varieties of strawberry plants have been important factors in strawberry production over the years. In 1955, 17 main varieties made up about 90 percent of the commercial acreage.[1/]

The interrelation of temperature and the length of daylight largely determine how well a variety adapts to a particular area. Environment affects the productivity of plants; the size, flavor, and firmness of fruit; and, in addition, the development of diseases. In general, the all-important flavor and "dessert" quality of strawberries are determined in large part by temperature--sunny days and cool nights being considered most favorable. Again, firmness of fruit, so

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1/ George Darrow, D. H. Scott, and George F. Waldo, Strawberry Varieties in the United States, U. S. Department of Agriculture Farmers' Bulletin No. 1043, rev. 1958, p. 3.

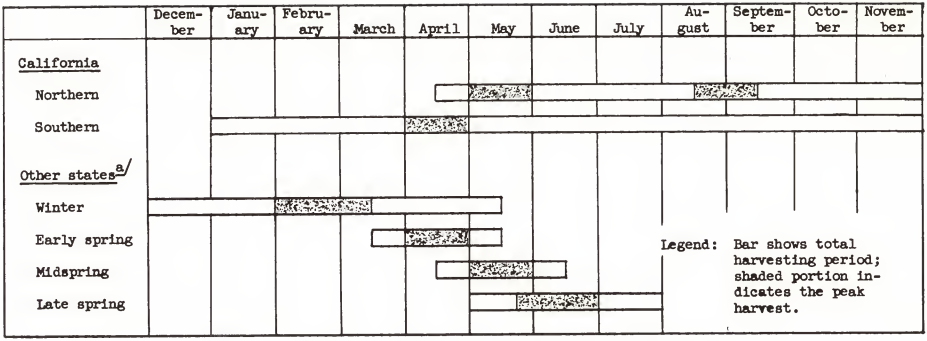

FIGURE 1. Production Periods for Fresh Strawberries

a/ For specific states in each harvest season see page 2.

important in fresh market production, is characteristic of cool temperatures. Various varieties have specific characteristics which make them peculiarly adaptable for certain uses; and, in turn, utilization of berries in different ways requires different product characteristics. For example, the Marshall variety as grown in Oregon is particularly adaptable to preserving. It hulls easily, is of medium size, firm with high flavor, and of light color which does not darken. The Missionary in Florida is firm, showy, and adaptable to shipping; the Shasta, as grown in California, is not only excellent for fresh shipping and in demand in the ice cream industry but, also, the long seasonal supply of berries of this variety makes it valuable for freezing. Again, to illustrate the importance of environmental factors, the Shasta, which was one of several important varieties developed by the University of California and put into commercial production after World War II, will produce over an extended period in sections of California but will give only one crop in Massachusetts. Transfer of varieties to other regions with favorable results is not always possible. This is tentatively explained by climatic conditions which cannot be fully understood even after extensive experimentation.

Commercial Strawberries in the Prewar Fresh Market

The cultivation of strawberries as a commercial crop before World War II had established techniques which varied somewhat by area and by variety grown; but, in general, cultural techniques were determined by the type of product and the use to which it was put. Plantings varied from an annual to a three-year period, the most popular method being the "three-year matted row" system. In this procedure the plants are plowed up and new plantings established after three years, generally at a rate of five to six plants per square foot. This method of planting was adopted not only because of difficulty of weed control, prevalence of disease and insect infestation, loss of fertility of soil, and attendant problems but also because most varieties tend to be less vigorous and productive over time.

Since the major percentage of the crop in the prewar period went to the fresh market, care in handling, picking, grading, and packing were of extreme importance. Inspection by federal and state officials was extensively used for quality determination, and rapid shipment and marketing were of paramount importance. Transportation techniques were developed to meet the needs of a highly perishable product--motor truck transport being largely used, although

refrigerated railway car, express, and occasional air shipment were also developed. Improvements in all these facilities and techniques were important, and precooling techniques were of assistance as well as the development of mixed car refrigerated shipment at peak periods. A large temporary labor supply was necessary with the attendant problems of using transient workers under careful supervision.

The wholesale price of strawberries for fresh market possibly fluctuated more than for any other crop. Changes in supply were the major factor, with gluts developing in one market while undersupply was possible in another. Orderly movement to market was a major problem, accentuated by the seasonal character of the berry. Quality, grade, and flavor determined both use and price. Sales in general were handled at shipping point auction; but methods varied by areas. Brokers, association managers, or sales agents were most commonly used, supplemented by on-the-spot sales to buyers by the growers themselves.

Postwar Developments in Processing--The Importance of Quick-Freezing

The quick-freeze process had been developing under constant experimental use since approximately 1929, but only after World War II did the acceptance of improved techniques create an impact which became a major factor in the strawberry industry. Technological improvements were made; facilities for distribution, storing, and merchandising of frozen strawberries were expanded; and consumer acceptance of the product seemed assured.

The development of frozen foods in general--of which frozen strawberries were an important part--changed the type, the need, and the location of refrigerated storage space. In earlier years there was little necessity for freezer space, but frozen foods requiring 0° F. storage changed all this. Some cooler space was converted to freezer space; but, in the main, the facilities that were developed were newly constructed. Between 1941 and 1957 national freezer space increased 326 percent. While refrigerated space was in general near the consuming centers, new freezer space was located mainly in producing areas because of special technical needs as well as considerations of inventory management, distribution costs, and space availability.[1/]

1/ U. S. Agricultural Marketing Service, Agricultural Marketing, Vol. VII, No. 3 (March, 1962), p. 3.

The development of the quick-frozen berry can be viewed economically as the introduction of a differentiated product with attendant far-reaching effects on the industry as a whole. Strawberries had been frozen and packed in barrels for food manufacturers for decades, but the new techniques of small-pack, quick-freezing actually produced a new and different product. The development of the quick-freeze method of processing had noticeable effects on many fruits and vegetables; but the strawberry was, perhaps, peculiarly adapted to the uses of this new and constantly improving method of preservation. Several factors contributed to the special position of the strawberry as a successful quick-frozen product: (1) the high perishability of the crop, (2) the distance of favored high-yield and quality production areas from major markets, (3) the desire of the consumer to eat strawberries the year around, and (4) the convenience and quality of frozen strawberries. Strawberries early proved to be one of the most successful of all frozen foods, possibly because so much of the natural freshness seems to be retained in the frozen product and because it was traditionally viewed as a "luxury" item, now offered at a competitive price.

By 1955, the frozen strawberry pack for the United States was larger than that of any other frozen commodity except orange concentrate.[1/] This leadership, although important, proved temporary. In the late 1950's, the frozen strawberry pack once more fell behind the pack of frozen peas in total poundage, and frozen potatoes have by now assumed first place. Nevertheless, the strawberry is an important, staple, high-volume product of the entire frozen food industry.[2/]

Changes in Strawberry Culture to Supply New Process

Changes wrought in the entire picture of cultural, transportation, and marketing techniques by the development of the quick-freezing process can scarcely be overemphasized. The entire pattern of utilization of the strawberry was so materially altered after this technological change as to give rise to a quite different strawberry production industry. All the factors noted in the previous section describing the prewar commercial strawberry industry continued to be

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1/ "1957 Almanac of the Frozen Foods Industry," Quick Frozen Foods, Vol. XIX, No. 6 (January, 1957), pp. 247-278.

2/ "1961 Frozen Foods Almanac," Quick Frozen Foods, Vol. XXIV, No. 4 (November, 1961), pp. 133-164.

important for the production of commercial strawberries for fresh market in the postwar period. Improvements in cultural practices for growing strawberries--introduction of irrigation, fertilization, disease control, weed eradication, and many others--were important in strawberry production for all uses. Advances in refrigerated transportation by truck and rail were made. The addition of air shipment to the improvements in other means of transport of both fresh and frozen berries aided the entire industry. But the major change in the industry can be attributed to the change in utilization of the berry itself.

Emphasis on steady, dependable sources of constant supply produced new requirements for strawberry acreage. The special advantages of seasonal length and spread were heightened, giving California's crop a unique position of strength clearly illustrated in Figure 2.[1/] Higher quality still moved to fresh market; but handling techniques could be modified, and use for processing was no longer a "distress" outlet moving necessarily at a lower price but a primary use with favorable prices offered by the freezers. The change in utilization and steadier future demand brought new acreage under cultivation. Strawberries were no longer a sideline but, rather, a single crop--a specialization. Strawberry culture became an intensified operation and occasionally, as in California and in some parts of the Pacific Northwest, a large-scale operation. The shift in the use of the product also brought shifts in land use, labor requirements, marketing arrangements, and transportation.

The combination of the development of the frozen strawberry industry, almost simultaneously with the entry of the enormously high-yielding strawberry acreage of California into the national picture at the end of World War II, produced a decade of growth and change in strawberry production in the United States. Since these two factors were interacting as well, each multiplied the effect of the other.

The Leveling-Off Period in Strawberry Production

Adjustment was not long in coming. By the end of what could be termed a "boom" decade, consumption was no longer keeping up with the increase; less favorable returns in 1956 brought an adjustment of acreage and a change in the

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1/ Compare with Figure 1.

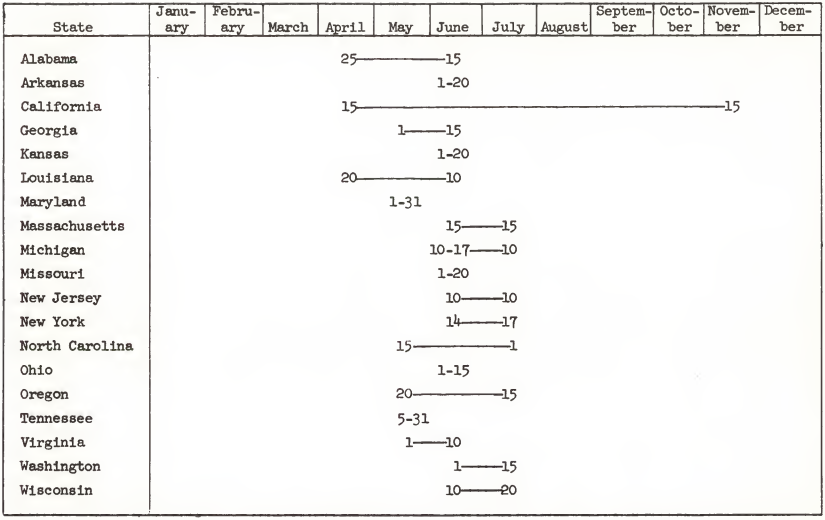

FIGURE 2. Processing Season for Strawberries by States, 1958[a/]

a/ Seasonal variations alter actual processing dates annually, but the usual range is near that shown here.

Source: "1958 Almanac of the Frozen Foods Industry," Quick Frozen Foods, Vol. XX, No. 8 (March, 1958), p. 171.

utilization pattern in the next few years which were again particularly noticeable in California. An important influence in this adjustment period was the role played by end-of-season carry-over of frozen strawberry stocks. The freezers have been reluctant to get themselves into the situation faced in 1957 when the carry-over ran above 100 million pounds, frozen weight, for the United States as a whole.

Although California experienced a sizable cutback in total strawberry production from the peak of 1956-57--which was also true of the United States as a whole--the Pacific Coast, as a region, has continued its relative growth even during the leveling-off period, thus establishing California, Oregon, and Washington as the dominant area of strawberry production. There has been a noticeable nationwide decrease in acreage since 1957 (the United States figure has been below 100,000 acres since 1959); and California's 1962 total acreage is only half the 1957 figure, although average yield is appreciably higher per acre. Oregon and Washington, however, have not undergone any substantial reduction, and the Northwest production for processing--which is its most important use--has maintained an average level at about the 1955 figure.

Introduction of Mexican Frozen Strawberry Industry

An additional recent change in the frozen strawberry segment of the industry is still a minor but interesting phenomenon for investigation. Since 1952, a frozen strawberry industry has literally been created in Mexico in the plateau areas of two states north of Mexico City. The production of strawberries for freezing in this area and the building of more than 11 freezing plants by 1960 have assumed considerable importance for the economy of the specific section and possibly even for Mexico as a whole. The implications of the establishment and growth of this new frozen strawberry industry are more important, for the moment, than the actual size of the industry. The importance of this Mexican industry growth to the strawberry growers and processors of the United States--and particularly of California--rather than its internal implication, is our concern in this review of the strawberry industry; and we shall discuss this new import situation further at the end of Part IV of this report.

We now turn from this summary to a somewhat more detailed discussion of the trends in strawberry production in the United States: first, with an emphasis on the postwar decade and, secondly, a description of the California

strawberry industry--its position in and effect on the industry as a whole. We shall also be particularly interested in the Pacific Coast regional pattern of the industry and the relationship between California and the Pacific Northwest in the development and maintenance of competition and price relationships between the two areas. We shall also look briefly in this connection at the Mexican import situation and bring together as much information as is now available about effects on processed strawberry prices of the various competing areas.

II. Strawberry Production in the United States--Postwar Changes

Prewar Acreage, Production, and Yield

Production of strawberries for the commercial market has been shared by states from coast to coast with approximately 31 states producing a crop of commercial value during the years on record. Since the early years of 1928 and 1929 when the total United States acreage devoted to raising strawberries commercially was over 200,000, the long-term trend in acreage has been downward. Production, however, was relatively stable during the 1930's, ranging from 9 to 12.5 million crates per year with the depression years showing the lower figures.

In 1942, which was the last year before the war conditions curtailed strawberry growing, United States production had reached a peak of 13 million crates grown on 156,000 acres. At that time California produced only 4.5 percent of the total crop marketed that year; and the Far West combination produced, on an average, less than 20 percent of the commercial strawberries in the United States. By 1953, these three states were to be first, second, and third in the nation in American production with 57.5 percent of the total United States crop grown within their boundaries.

Another important change in strawberry production can be highlighted by reference to 1942. In that year over 85 percent of the commercially valued crop went to the fresh market. Of the 28 states producing strawberries, only Louisiana, Virginia, Washington, and Oregon diverted any of their crop to processing. Oregon and Washington were the only states whose production for processing was of noticeable importance, and here the major percentage of the crop was preserved. California, in the main, supplied its own needs with very few cars shipped out of state.

Even in this prewar period, however, yield per acre in California was in general more than twice that of the average yield in the nation as a whole.[1/] Nonetheless, the very large difference between California yield and that of the rest of the United States was to develop only after the war and, therefore, became a dramatic factor in the industry.

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1/ See Appendix Table V.

Trends in Acreage and Utilization After World War II

The trends in United States production from 1946 to 1955--the latter year marking the approximate first point of return to prewar levels of overall production--are shown in detail in Appendix Tables I to V. From these tables, which cover the early prewar years and continue to the present, we see indications of the trends and prewar levels of acreage, production, utilization, and yield for strawberries and may compare these with the postwar years and current observations. Data are given for the United States as a whole, for individual states, and by seasonal groupings of states.

There are several technical points that should be mentioned in considering the statistics of the strawberry industry both for the United States as a whole and for California's position in that industry.

1. Production figures for strawberries in the United States until 1955 were reported by the U. S. Department of Agriculture in crates. These crates were considered to be equivalent to 36 pounds of fresh strawberries (with stems and hulls) or 34 pounds of berries for processing (hulled). Since 1955 strawberry production figures have been reported in pounds, thus reducing statistical and reporting complexities. California, however, has never used the crate measure as defined by the U. S. Department of Agriculture and as used in the rest of the country. In this state fresh strawberries are packed in trays. The difference in measurement becomes noticeable because, although a tray contains 12 pints in California which might be assumed to be one-fourth of a 24-quart crate as used in the rest of the country, the actual weight does not have this arithmetic relationship. A California tray of strawberries contains approximately 11½ pounds net weight.[1/] Thus, if four trays were assumed to equal a United States crate, California weight per crate would be approximately 46 pounds per crate rather than the 36-pound figure quoted by the U. S. Department of Agriculture. The difference between California measurement and the rest of the country does not interfere with data on strawberries for processing since these have habitually been reported essentially on a pound basis.

All current reporting for strawberries is now done by pounds, so the differences in measuring units no longer trouble those assessing current statistics.

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1/ Industry sources quote 13-pound billing weight.

When the revised figures were estimated by the U. S. Department of Agriculture for the years 1949-1955, however, the difficulties inherent in all such conversions were additionally complicated by California's measuring unit. Thus, although we use for our computation purposes the U. S. Department of Agriculture series in pounds for 1949 to the present, it must be recognized that these estimated figures for 1949-1955 have the added difficulty of having been converted at varying weights applied to California and may have a tendency to underrate California's share of total United States production during that period.

For the immediate postwar years, 1947 and 1948, there is an additional difficulty. Estimated production of strawberries made by the U. S. Department of Agriculture within the last two years but covering these earlier years for California and the United States strawberry production (shown in Table 11, page 43) indicates an annual figure approximately 2 million pounds lower than that estimated by the writers of this report. Since the probability is quite strong that California production was underweighted throughout the period, the estimates used in Part VI and throughout the statistical analysis are the higher figures shown in Tables 25 and following. Although the differences are not significant enough for these two years to affect any of the conclusions of the analysis, it should be remembered that there is a possibility that California production was actually somewhat greater than official figures indicate in all years before 1955. Thus, the California boom effect noted in 1955-56 production could conceivably be exaggerated by the change in method of reporting strawberry statistics, in addition to the other factors described in detail in Part II.

2. Price data for strawberries used in this study are described in detail in Part VI. At this stage, however, it should be noted that the difficulties outlined above for the estimates of production of strawberries in the years before 1955 may affect also the quotations of season average price to growers for this period. These grower prices have an additional qualification associated with the measurement problem we have discussed which we should note here briefly, although its implications will be developed later.

Season average price to grower for strawberries is quoted in both national and state departmental publications (1) for all uses and (2) for fresh market and processing, separately. However, there is not a strict comparability between the fresh and processed price series, nor can they be compared in the strictest sense of the term. Price to growers for processing strawberries is quoted on a "naked fruit" basis. Price to growers for fresh market, however, includes

at least the container cost; often the selling charge; and sometimes even the transportation from field to storage, precooling, loading, etc. In a sense, therefore, the reported price paid to growers for fresh strawberries is more an f.o.b. price than an actual price to growers. In California the container cost may run around 25-35 cents a crate.

3. On a seasonal basis, California is considered as falling within the midspring group with peak period of harvest in April and May. Although it is true that California's highest peak period is in midspring, with southern California harvesting early in April and central California shortly thereafter, actually there is a second summer harvest in central California; and, as has been noted, California strawberries yield fruit longer than in any other state in the United States. Therefore, although California's place in total United States production is not affected, California's position within the midspring category tends to be somewhat exaggerated because all harvest is considered as falling in the midspring grouping; and the midspring group in turn is weighted somewhat heavily in the national picture because California is considered a part of this group.

A survey of the basic trends in the strawberry industry in the United States since World War II discloses, as we have already noted (1) striking developments in the frozen strawberry industry and (2) the emergence of California as the leading producer. Additional important postwar trends may be summarized as follows:

1. There has been a nationwide decline in average acreage devoted to the production of strawberries. California, Washington, and Oregon are individual exceptions to this trend, and Michigan's increase in acreage since the war has brought back that state's average acreage harvested near to prewar levels.[1/] The position of the various seasonal groupings within the overall acreage total has not changed substantially over the 20-year period, although in percentage the midspring and late spring groups did gain in position as winter and early spring states declined during the postwar period we have designated as the boom years (see Appendix Table I). Since 1958, however, there has been something of a resurgence of the early spring group, a still higher percentage of acreage attributable to the late spring group, and a slow decrease in the midspring group, chiefly represented by California's acreage decline.

1/ These states are discussed more in detail later in Part IV.

2. Nationwide production of strawberries increased for more than a decade. As noted above, total production had approximately reached its prewar levels by 1955, and further increases up to more than 25 percent were experienced by 1957 when the total national production was over 550 million pounds. One of the important factors in this increase in production was the absolute and percentage increase in the share of this production gained by the midspring states, of which California is the most important member. This midspring grouping has produced over 50 percent of the total United States production of strawberries for all uses almost every year since 1950. The late spring group, of which Oregon and Washington are a part, also gained in absolute terms, although the percentage increase in this group's share of total production has changed only slightly from the prewar share of national production, averaging over 40 percent of total United States production for fresh and processed use combined.

3. Production areas of importance shifted to the Far West. The dominant position of California, Oregon, and Washington will be considered in detail in Parts IV and VI. Although a study of this shift showing each state in detail is not possible in this summary (see Appendix tables for selected states), of all producing states, Tennessee of the midspring group is the only state outside the Far West which showed an increase in its share of production over the prewar years. However, Tennessee is not a leading state in relation to the industry on a nationwide scale. Michigan, on the other hand, has slowly been gaining in importance in the industry since the mid-1950's, while Louisiana has shown a fluctuating resurgence of growth and relative importance in the industry since 1958. The major share of Louisiana's strawberry harvest goes into the fresh market early in the season. Michigan, while sending twice as much tonnage into fresh market as into processing, nevertheless represents the only late spring seasonal area outside the Pacific Coast with even as much as a 4-5 percent share of the total United States production for processing.

The increase in total production, coupled with the decline in total acreage, indicates the next important postwar trend.

4. The newly important producing areas showed notable increases in yield. While the long-term trend in the winter and early spring states had been one of fluctuating but slowly increasing average yields, the main factor in the midspring group--which therefore influenced the total--was the tremendous increase in yields in addition to increased acreage, mostly attributable to California. In addition, Oregon, Washington, and Michigan have contributed the most to increasing

average yields in the late spring group. A detailed summary will be found in Appendix Table V for the period from 1924 to the present. While the trend demonstrated by this table is complicated by the fact that the yield is measured in crates per acre during the first decade, the dramatic development since the introduction of the new University of California varieties and new cultural techniques in the Far West is clear in the postwar period. The average yield for the United States as a whole increased almost steadily from 1949 on, averaging 5,000 pounds per acre in the last five years and 4,500 pounds for the five years preceding.

California's overwhelming relative advantage in yield compared with the rest of the United States has fluctuated. During the 1950's it was four times the national average, decreasing to only twice the United States average yield in 1957. Since then, however, strawberry yield per acre in California has been on the rise once more. Recent figures show California again with over three times the yield of strawberries per acre as that found in the United States as a whole. No other strawberry producing area parallels California conditions since California has a unique opportunity to harvest the major part of its acreage over an extended season. Yield figures for California are, therefore, peculiarly influenced by economic conditions for each annual crop as it reaches the conclusion of the projected "second harvest" months in the late summer. At this time, price considerations naturally determine whether harvesting takes place or abandonment or plow-out are substituted.

5. The final important trend which will lead directly to a brief consideration of the frozen strawberry industry in the United States is the change in utilization patterns for the strawberry crop in the postwar years. We have already noted the fact that the major percentage of all strawberries was marketed fresh prior to World War II for the nation as a whole. As production climbed after the war, however, a noticeably larger percentage went into processing channels each succeeding year with only 1949 and 1951 showing slight dips in the steady increase in strawberries for processing. In 1956--the peak year for processed strawberries--nearly 307 million pounds, representing better than 55 percent of the entire United States 1956 commercial crop, went to the processors. This was more than three times the total United States production for processing in 1949. (The percentage of total production for processing was slightly higher in 1955 but represented a smaller absolute figure.) The importance of California and the Northwest in this processing growth will be discussed later, but it

is interesting to note that in 1956 California processed 154.7 million pounds of strawberries or over half of all processed production in the United States.

Since that time, a period of readjustment and leveling off of production for processing has been experienced in the strawberry industry. Slightly less than half of the total strawberry harvest has been processed since 1956, and California's share has decreased again from one-half to about a third of the total.

"Processing" and "Frozen" in the Strawberry Industry

The steady increase of the total frozen strawberry pack (with the two years of exception already noted above) resulted in a peak of production in 1956 which was nearly five times the frozen pack for the peak prewar year 1942. It is clear that, although there is still a small amount of the strawberry crop preserved in jams and jellies and used in ice cream, etc., the overwhelming proportion of strawberries for processing now goes into quick freezing. Many ice cream manufacturers, for example, have shifted in the last decade to the use of frozen fresh strawberries rather than preserves or extracts in their production of ice cream.1/

The demand, therefore, created by the new processing for strawberries in large part accounted for the total production increases and shifted the utilization of the crop. The striking increases in the frozen strawberry pack of the early 1950's shifted the use pattern of the strawberry crop sufficiently to send close to 50 percent of the total strawberry harvest into processing after 1952. The West, which has always produced the major share of the crop for freezing and processing, has increased its share of this pack until it now produces more than four-fifths of the United States pack annually. In 1962 over 90 percent of the national frozen strawberry pack orginated in the western region.

In some sense, this has been at the expense of the share previously held by the southern producers and also those in the northeastern states. In the period of decrease in total frozen strawberry pack since the peak year 1956, the southern region is regaining something of its earlier share of the total pack; this, however, still means an average of less than 10 percent of the total.

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1/ Despite the increase in flavor choice, strawberry ice cream still seems to be the third largest seller nationwide.

Consumption of Fresh and Frozen Strawberries

As Table 1 indicates, per capita consumption of fresh strawberries in the United States showed a decline after a few postwar years of slight increase from wartime low levels. In the early years of the strawberry boom period, the level was relatively stable at about one-half the prewar consumption of fresh strawberries despite the steady upward trend of frozen strawberry per capita consumption. During the mid-1950's, fresh consumption fell noticeably as frozen rose rapidly. In 1957 and 1958 both figures rose, and in the 1959-60 period fresh strawberry per capita consumption was once more at the average level of the 1949-1953 period, while frozen strawberry per capita consumption had fallen noticeably for the first time in the history of the frozen strawberry industry.

As a matter of fact, the average annual increase in frozen strawberry consumption in the period 1954-1957 was about 0.026 pounds per person.[1/] Since 1957-58, however, the decrease has been precipitous enough to return the per capita frozen strawberry consumption to that of the early 1950's. One hesitates to make a prediction of the next few years' experience based on a short-run change of such relative magnitude, but it should definitely be noted for future reference of the industry as a whole.

In addition, it should be noted that a shift is taking place in the utilization of the frozen strawberry pack itself. Since 1947, at which time 68 percent of the pack went to institutional and 32 percent to retail trade, there has been a noticeable change (see Table 2).

The proportion of the total frozen strawberry pack going into retail channels has been 40 percent or above since 1949. From 1956 to 1959 over 50 percent was sold at retail; but, in general, the institutional channels have always taken more than half the frozen strawberry pack. Since 1959, as the frozen strawberry pack continued its downward trend, the institutional outlet seemed to be reestablishing the share it had had during the late 1940's.

Frozen strawberries have always dominated the retail frozen fruit market. In 1958, for example, they comprised 81 percent of the frozen fruit and berry pack in retail-size containers.[2/] It has been suggested, however, that additional

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1/ C. C. Dennis and L. L. Sammet, Regional Location of Production and Distribution of Frozen Strawberries, University of California, Giannini Foundation Mimeographed Report No. 231 (Berkeley, 1960), 68p.

2/ U. S. Agricultural Marketing Service, The Fruit Situation (June, 1959), p. 23.

TABLE 1

United States Per Capita Consumption of Fresh and Frozen Strawberries, 1937-1961

Year	Fresh strawberries (farm weight)[a]	Frozen strawberries (processed weight)[b]
	pounds	
1937	3.4	.21
1938	2.9	.29
1939	3.3	.39
1940	3.3	.44
1941	3.1	.52
1942	3.4	.58
1943	1.8	.32
1944	1.2	.33
1945	1.3	.24
1946	1.6	.38
1947	1.9	.73
1948	1.8	.78
1949	1.6	.97
1950	1.6	.87
1951	1.8	1.00
1952	1.6	1.21
1953	1.4	1.25
1954	1.3	1.43
1955	1.2	1.44
1956	1.5	1.49
1957	1.7	1.53
1958	1.5	1.52
1959	1.3	1.29
1960	1.4	1.15
1961	1.6	1.22

a/ For comparable retail weight, conversion factor is .89.

b/ It is estimated that processed frozen weight is generally 17-21 percent greater than delivered fresh weight.

Source: U. S. Economic Research Service, The Fruit Situation, August, 1961, 43p.

TABLE 2

United States Frozen Strawberry Pack: Percentage for Retail and Institutional Use, 1947-1962

Year	Retail[a]	Institutional[b]
	percent	
1947	32	68
1948	36	64
1949	45	55
1950	40	60
1951	43	57
1952	48	52
1953	46	54
1954	40	60
1955	46	54
1956	53	47
1957	50	50
1958	54	46
1959	41	59
1960	41	59
1961	43	57
1962	45	55

a/ Containers of 20-ounce net weight and less.

b/ Containers larger than 20 ounces; in large part, 30-pound containers.

Sources:

1947-1960: Quick Frozen Foods, Vol. XXIV, No. 4 (November, 1961).

1961 and 1962: National Association of Frozen Food Packers, Frozen Food Pack Statistics, annual issues.

competition has been a factor in the decline of frozen strawberry consumption in the past several years. Two specific developments are cited: (1) the production of other dessert-type frozen fruits with more interesting and unusual flavors and (2) the newly developed "prepared" or "combination" food-type deserts which are now presented to the consumer in frozen form.[1/]

Although additional important factors in the frozen strawberry segment of the industry will be discussed later in the part on price and demand factors in the strawberry industry, it would not be premature to venture at this point that it is now evident that the development of frozen strawberries has actually created as many problems for the producer and seller--and possibly the growers--as it initially seemed to solve. It may well be that the heavy production of strawberries had an effect on price more than offsetting, at least temporarily, the lower unit costs of production. The question of the larger investment involved in the new process, all the way from producer to household, is also an important consideration which can be discussed most effectively in the larger context of the frozen food industry as a whole and only can be noted in passing here.

A Look Ahead

Future developments, as we have already indicated, are most uncertain. A stabilization of the present position would seem most likely after the boom and retrenchment stages we have outlined. But technological improvements and product changes at the processing level, as well as possible further varietal discoveries or improved cultural methods at the growing stage, might always put a different aspect on the practices in the strawberry industry as they have in the past. Different marketing methods and promotional techniques are already being tested; transportation problems are being reassessed, locational factors re-examined, and quality of product questioned.

All these are important considerations in the strawberry industry as a whole and to California as a leading producer in particular. It is to California's strawberry industry that we now turn.

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1/ E. W. Williams, "What's Ahead in Frozen Foods," Quick Frozen Foods, Vol. XXIV, No. 4 (November, 1961), p. 78.

III. Strawberries in California--Production Trends

The production of strawberries might almost be said to be a new industry in California in the postwar years. Previous to World War II, California had been a minor factor in the national strawberry industry, supplying its own needs, shipping a few cars to the Northwest or intermountain area and a very few cars to Chicago or New York. With the exception of a very small amount of the total crop which went to preserving and processing, strawberries in California went into the fresh market.[1] In 1944-45--the wartime low point for the nationwide industry as a whole--California produced under 4 percent of the total United States production (560,000 trays). The wartime drop was, of course, due to a sharp curtailment of acreage (only 1,200 acres or less were harvested in California during those years) not only because of the resettlement of the Japanese but because of the lack of available labor, with manpower going to more demanding needs. Before the war, however, California production had averaged less than 8 percent of the United States total and, in acreage, less than 3 percent. In the prewar peak year of 1942, as we have noted, California produced only 4.5 percent of the total national production for commercial market.

California Becomes Leading United States Producer

But so remarkable was the postwar development of the strawberry industry in California--or, as we have suggested, the introduction of the "new strawberry deal" in California produced such a dramatic change--that California not only entered the national picture with a forceful postwar impact but by 1949-50 came to the fore as the leading producer of strawberries in the United States. The total United States production in 1950 was 393,617,000 pounds, of which California supplied 20.7 percent.

What were the outstanding reasons for this striking development in strawberry production?

1/ Appendix Table XII shows a frozen strawberry pack of nearly 6 million pounds attributed to California in 1942, which would be a little over 9 percent of the United States total of 63.8 million pounds quoted for that year. There is some question about the accuracy of those earlier records, however.

1. The introduction of several new so-called University varieties came at a time of general "recovery" of the industry and were found to yield at very high rates over an extended season.1/

2. A rapid increase of acreage coupled with these new long-bearing, heavy-producing varieties--particularly in the Central Coast areas and strikingly in the Salinas-Watsonville area--brought California's total production to 81.3 million pounds by 1950. Other states had higher acreage figures, but none could compare in yield.

3. The combined effect of increased strawberry production in California, coupled with the development of the frozen strawberry industry, shaped the most important segment of the national strawberry picture. The interaction of the demand of that "new industry" for a constant, dependable supply of fruit--and the offering of favorable prices due to its constant expansion--so changed the utilization of California production that by 1955 California supplied 37.3 percent of the total production of the United States, and over 60 percent of California's total production went into processing. The percentage of the total United States crop channeled to processing that year was 58 percent. The national frozen strawberry pack was 276,180,000 pounds, of which California supplied 119,505,000 pounds, or 43.3 percent.2/

New Strawberry Varieties in California--A Striking Yield

California's strawberry yield was far above the national yield per acre in the prewar period. The average yield per acre for the decade before 1942, for example, was nearly two and one-half times that of the average national yield. Favorable climatic conditions and the longer "double" harvest were undoubtedly responsible. However, the introduction of the new, heavy fruiting varieties in 1945 by the University of California and the adoption of these varieties by growers (the Lassen used in southern California and the Shasta in north central) caused the California yield figure to nearly double its own prewar levels. Thus, by 1950, when California became the nation's leading strawberry

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1/ The Shasta and Lassen varieties of strawberry were two of the most commercially successful of the early new varieties developed by the University of California.

2/ The even larger pack of 1956 and greater California percentage will be discussed in the section on processing.

producer, its position was largely attributable to the outstanding yield per acre, which by that time was more than five times the national average (see Appendix Table V for annual comparative figures). The yield that was made possible by the introduction of the new strawberry varieties was enlarged not only by the characteristically long harvest season in California but also by improved cultural practices on the part of growers. Irrigation and fertilization in systematic fashion were emphasized. Newly developed herbicides and fumigants aided plant growth and weed control. Newly planted acreage took advantage of new techniques. It is also true that costs of production could be reduced when producing for freezer use, since acreage could be retained into the fourth and fifth year without removal, while much fresh strawberry acreage is replanted annually or after the second year.

As in past experience with strawberry plant varieties, the extremely heavy yield of the early years of Shasta and Lassen berries did taper off in time. The yield of the early 1950's, which averaged over 13,000 pounds per acre (a figure more than three and one-half times the national average), turned downward after 1953, at which time it had reached a peak of over 16,000 pounds per acre. The 1957 yield, which marked the low point, was 10,800 pounds per acre. That year, it is true, was an unusually low-yield year, and the yield of any one year can be the result of many conditions--plowing out of second crop, weather, disease, insects, special economic circumstances, etc. By 1959 it seemed that the apparent leveling off of the yield trend at a lower level than had been experienced in the early 1950's was a part of the general adjustment picture of the strawberry industry in California.

However, the steady upward yield trend since the low point of 1957 seems to belie the earlier indications that the University varieties are "running out."[1/] The astonishing jump from 13,400 pounds per acre in 1960 to 17,800 in 1961 was emphasized by a harvest of 19,800 pounds per acre in California in 1962. Experts attribute the exceptional rise in strawberry yield in California to extraordinarily favorable weather conditions during these two years.[2/]

1/ Additional varieties also have been successfully introduced. The Solana is now used quite extensively.

2/ It has been suggested that recent cold winters have invigorated the established varieties, particularly the Shasta in the Salinas Valley. Summer plantings in southern California have also proved successful. In addition, University of California scientists have developed a new fumigant for preparation of the soil (Dr. Wilhelm) and elimination of the cyclamen mite (Dr. Allen) now used extensively throughout California.

California Acreage in the Postwar Period--Through the Boom Period to 1957

Acreage devoted to strawberries in the decade after the war showed two important trends:

1. An overall increase in total acreage in the state.
2. A larger increase in the north central California area than elsewhere in the state, with the dominant position held by the Salinas-Watsonville section of the Central Coast (in Monterey and Santa Cruz Counties).

For the decade before 1937, California had harvested less than 5,000 acres of strawberries per year. From 1937 on, there had been a small increase in acreage followed by the steep wartime decline. Acreage in California had not regained its prewar peak by 1950, although California had become the leading United States producer. The increase from 1950 through 1957, however, brought California acreage to an all-time high of 20,700 acres in the latter year--a figure nearly five times greater than the acreage in 1949 or the average annual acreage harvested during the 1930's. This increase was the more noteworthy since it came during a period of general national acreage decline. Whereas California harvested 3.8 percent of the total United States acreage in 1949, nearly 17 percent of the total acreage of strawberries was found in California by 1957 (see Table 3).

All California Divided into Two Parts

As is true in the growing of many fruits and vegetables, California in the strawberry industry is really two "Californias"--north central and southern. California's strawberry-producing acreage is divided between these two sections of the state, complicating the seasonal and marketing pattern. The southern California area matures in March-April and could therefore be classed as early spring in the national picture--technically in competition with Louisiana and Alabama;[1/] whereas, the north central California area really has two harvesting seasons--the heaviest one in May, which is classed as midspring, often continuing through June-July, and again in August-September after all other strawberries, nationwide, have been harvested.[2/] The midspring period could be considered to

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1/ Much of the southern California production that is sold fresh, however, is marketed within the state.

2/ This is sometimes classed as a "second" harvesting, technically giving California three harvesting periods.

TABLE 3

United States and California Compared in Strawberry Acreage Harvested
1949-1962

Year	United States	California	Column 2 as percent of column 1	Midspring states	Column 4 as percent of column 1	Column 2 as percent of column 4
	1	2	3	4	5	6
	acres			acres		
1949	116,150	4,400	3.8	49,400	42.6	8.9
1950	126,030	5,700	4.5	56,830	45.1	10.0
1951	139,120	6,900	5.0	66,870	48.1	10.3
1952	123,350	8,400	6.8	61,000	49.5	13.8
1953	99,600	9,400	9.4	38,400	38.6	24.5
1954	96,200	10,900	11.3	36,250	37.7	30.1
1955	100,490	14,000	13.9	38,710	38.5	36.2
1956	114,710	19,000	16.6	55,430	48.3	34.3
1957	122,170	20,700	16.9	57,400	47.0	36.1
1958	109,230	17,000	15.6	50,800	46.5	33.5
1959	96,560	13,200	13.7	40,900	42.4	32.3
1960	95,730	11,700	12.2	39,300	41.0	29.8
1961	91,920	11,500	12.5	37,200	40.5	30.9
1962	94,970	10,500	11.1	36,450	38.4	28.8

be in competition with the largest number of strawberry-producing states, the most important of which are Arkansas and Tennessee. The competing states in closest proximity--Washington and Oregon, in the Pacific Northwest[1]--harvest their crops in the late spring group, with Michigan an important factor in this group; the final harvesting of the north central California crop then concludes the strawberry calendar.

Although California acreage figures were more traditionally given by county, it has become more interesting and economically more significant in the postwar period to group the various producing areas and compare their relative position in the state in this way, divided into the two separately maturing districts of California (Table 4). As we have indicated, in the period from 1949 to 1957, California's increase in strawberry acreage harvested became impressive in the national total. The total acreage in California was five times greater in 1957 than in 1949; but, viewed by section, that of the north central California area was six times greater than in the earlier year, while the southern California acreage slightly more than doubled. Within the north central grouping, the Salinas-Watsonville area (Monterey-Santa Cruz Counties) increased 17½ times its 1949 acreage to become the most important strawberry-producing area in the state and the nation. The 1957 Manteca-Modesto acreage (San Joaquin-Stanislaus Counties) was nearly six times its 1949 figure, although 1956 actually represented the peak acreage for this area (2,750 acres--nearly eight times the 1949 figure). By 1957, this particular strawberry area had decreased by 630 acres and therefore led in the adjustment period we shall discuss in the next section.

The southern California acreage increase was shared by the various producing areas in that section of the state and was not marked by a mushrooming growth at any particular point, as was characteristic in north central California. To emphasize the dominant position of the north central area in acreage, it can be noted that, in 1949, 72.9 percent of the acreage harvested was in that section of the state, with 27.1 percent grown in the south. By 1957, 88.6 percent of the total California acreage was in the north central counties, and the southern California share had decreased to 11.4 percent of the state total.

1/ Over 90 percent of the Northwest crop goes into processing channels, and almost none is marketed fresh outside the two states' boundaries.

TABLE 4

California Strawberries Harvested by District-County Groupings, 1949-1962

California	1949	1950	1951	1952	1953	1954	1955
	acres						
North central							
Alameda-Santa Clara-San Benito	1,200	1,370	2,380	2,660	2,700	2,970	3,300
Monterey-Santa Cruz[a]	530	620	1,020	1,450	1,900	2,750	4,350
Sacramento	300	300	300	250	250	330	300
San Joaquin-Stanislaus[b]	360	510	660	870	1,060	1,610	2,400
Fresno	80	200	300	300	300	310	330
Santa Barbara-San Luis Obispo[c]	290	440	700	1,000	1,050	1,090	1,300
Other	230	200	380	420	510	400	220
Group total	2,990	3,640	5,740	6,950	7,770	9,460	12,200
Percent of state total	72.9	75.8	83.2	82.7	82.7	86.8	87.1
Southern							
Orange-Los Angeles	630	710	690	930	1,000	900	1,140
Ventura[d]	e/	e/	e/	e/	150	150	250
San Diego	290	300	300	300	250	250	300
Other	190[e]	150[e]	170[e]	220[e]	230	140	110
Group total	1,110	1,160	1,160	1,450	1,630	1,440	1,800
Percent of state total	27.1	24.2	16.8	17.3	17.3	13.2	12.9
State total	4,100	4,800	6,900	8,400	9,400	10,900	14,000

(Continued on next page.)

Table 4 continued.

California	1956	1957	1958	1959	1960	1961	1962[f]
	acres						
North central							
Alameda-Santa Clara-San Benito	3,780	3,820	3,580	2,460	1,830	1,480	1,100
Monterey-Santa Cruz[a]	7,900	9,800	7,400	5,900	4,580	4,400	4,570
Sacramento	250	220	180	[g]	[g]	[g]	[g]
San Joaquin-Stanislaus[b]	2,750	2,120	1,220	1,010	1,060	1,130	780
Fresno	300	250	200	150	190	225	200
Santa Barbara-San Luis Obispo[c]	1,660	1,780	1,820	1,280	1,290	1,360	1,260
Other	240	360	240	330[g]	310[g]	315[g]	205[g]
Group total	16,880	18,350	14,640	11,130	9,260	8,910	8,115
Percent of state total	88.8	88.6	86.1	84.3	79.1	77.9	77.3
Southern							
Orange-Los Angeles	1,270	1,400	1,600	1,300	1,650	1,740	1,670
Ventura[d]	250	300	310	420	460	510	470
San Diego	450	400	250	200	190	230	160
Other	150	250	200	150	140	110	85
Group total	2,120	2,350	2,360	2,070	2,440	2,590	2,385
Percent of state total	11.2	11.4	13.9	15.7	20.9	22.1	22.7
State total	19,000	20,700	17,000	13,200	11,700	11,500	10,500

(Continued on next page.)

Table 4 continued.

a/ Includes Salinas and Watsonville.

b/ Includes Manteca and Modesto.

c/ Includes Santa Maria.

d/ Includes Oxnard.

e/ Ventura is included in "Other."

f/ Estimated.

g/ Sacramento is included in "Other."

Sources:

1949-1961: California Federal-State Market News Service, Marketing California Strawberries, 1961 Season (San Francisco, 1962), 56p.

1962: California Crop and Livestock Reporting Service, California Vegetables (Sacramento, April 10, 1962).

Post-1957 Adjustment

As we have noted, the Central Valley area around Manteca-Modesto led the cutback in strawberry acreage which was to characterize the adjustment period of the late 1950's, particularly in the north central growing areas of California. Sizeable acreage reductions were found in all the north and central groupings in 1958 (see Table 4), with the exception of the Santa Maria area (Santa Barbara-San Luis Obispo Counties) where the first decrease did not take place until 1959. From the location of the acreage which was dropped and the size of the reduction, it seems reasonable to suggest that it was the speculative production-for-processing acreage that was the first to be abandoned after the sharp drop in price occasioned by the peak production year.

The strawberry acreage in southern California, which in general is harvested for fresh market disposition, was not subjected to the decreases found in the north central area. As a matter of fact, despite a small, continuing decrease in the San Diego area since 1956, the southern California strawberry acreage has maintained a small annual increase for the area as a whole, with the exception of 1959 when a sharp drop of 300 acres in the Orange-Los Angeles area was experienced. Southern California therefore has been slowly reestablishing its earlier proportional share of total California acreage harvested as California's total acreage has declined.1/ In 1961, slightly over 22 percent of the strawberry acreage was harvested in southern California; 1962 estimates show some decrease in total acreage in the south, yet the anticipated share of California's total will be nearly 23 percent.

California's Place in United States Total Acreage Decline

California's position in the total United States pattern also faced readjustment in the late 1950's. After the sharp decrease in strawberry acreage of 1958, both nationally and in California, in which year California's relative share declined for the first time since the war, a gradual decline in the total national acreage harvested has been accompanied by a decline in California's total acreage. California's percentage of the total United States figure has also decreased almost every year (see Table 3). The total United States acreage, however,

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1/ Note that this corresponds to the reestablishing of a larger share of California production going into the fresh market channel (see Table 14).

showed a small increase of approximately 3,500 acres of strawberries for 1962 in Florida and Louisiana for winter and early spring harvests and Washington and Oregon of the late spring group.

Age of Acreage Planted in California

Because of the particular cultural characteristics of strawberry acreage in general and that grown in California in particular, it is helpful to be more specific about strawberry acreage than just to know the number and location of acres planted. If projections of production are to be made, problems of growers anticipated, and changes in the market ameliorated, age of acreage should be known. Recently, the California Crop and Livestock Reporting Service began to collect acreage statistics by age of plants as well as by total. Data on first-year plantings and acreage by year's growth through the fourth year were collected in 1958 for the first time, and such data have been available annually since that year. Tables 5 and 6 are detailed accounts of acreage, by age of strawberry plants, for 1958 (the first year the survey was made in this manner), and 1961 (a recent year with final figures available).

In 1958, the most striking detail is the small percentage of new plantings in the north central section of California and the large percentage of acreage in its third year. Southern California (in adjusted totals, see note to Table 5) apparently had approximately 50 percent of its total acreage in new plantings, with almost no acreage held through four years. This would be a logical development in the southern section of the state where fresh market strawberries are the most favorable crop. First- or second-year plants in California are generally considered by experts to be the best in quality and size for fresh market channels, so that it is not surprising to find the proportion of new planting to older acreage remaining high in southern California.

Because of leasing arrangements, it might also be true that speculative acres would, in general, be in the new and younger acreage category. It will be noted in Tables 7 and 8 that there has been a substantial increase in the proportion of younger acreage in the north central California strawberry fields since 1958, although again it must be remembered that the total acreage in this area has decreased by nearly one-third during this time.

Production Figures in California's Growth Period

In prewar years, California supplied less than 10 percent of the total strawberry production in the United States (see Appendix Table II). Immediately

TABLE 5

California Strawberry Plantings by District-County Groupings
1958 Preliminary Acreage by Ages

California	Plantings				
	First year, November, 1957-April, 1958 a/	Second year, November, 1956-October, 1957	Third year, November, 1955-October, 1956	Fourth year and older, planted before 1955	Total, all ages
	acres				
North central					
Alameda-Santa Clara-San Benito	525	845	1,705	505	3,580
Monterey-Santa Cruz	1,085	1,805	3,190	1,220	7,300
Sacramento	45	60	70	5	180
San Joaquin-Stanislaus	320	330	440	180	1,270
Fresno	25	70	75	30	200
Santa Barbara-San Luis Obispo	425	655	630	210	1,920
Other	45	80	80	35	240
Group total	2,470	3,845	6,190	2,185	14,690
Age distribution as percent of group total	17.0	26.0	42.0	15.0	100.0

(Continued on next page.)

Table 5 continued.

	Plantings				
	First year, November, 1957-April, 1958[a]	Second year, November, 1956-October, 1957	Third year, November, 1955-October, 1956	Fourth year and older, planted before 1955	Total, all ages
	acres				
Southern					
Orange-Los Angeles	710	385	165	40	1,300
Ventura	140	155	5	30	330
San Diego	60	190	0	0	250
Other	75	85	70	0	230
Group total	985	815	240	70	2,110
Age distribution as percent of group total	47.0	39.0	11.0	3.0	100.0
State total	3,455	4,660	6,430	2,255	16,800[b]
Age distribution as percent of state total	21.0	28.0	38.0	13.0	100.0

a/ First year age survey was made.

b/ Revised acreage figures show that the total for 1958 was actually 17,000; for north central, 14,640; for south, 2,360.

Source: California Crop and Livestock Reporting Service, California Vegetables (Sacramento, April 14, 1958).

TABLE 6

California Strawberry Plantings by District-County Groupings
1961 Preliminary Acreage by Ages

California	Plantings				
	First year, November, 1960-April, 1961	Second year, November, 1959-October, 1960	Third year, November, 1958-October, 1959	Fourth year and older, planted before 1958	Total, all ages
	acres				
North central					
Alameda-Santa Clara-San Benito[a/]	325	465	445	245	1,480
Monterey-Santa Cruz	1,465	1,375	1,355	405	4,600
San Joaquin-Stanislaus	255	335	395	145	1,130
Fresno	60	95	55	15	225
Santa Barbara-San Luis Obispo	565	495	245	55	1,360
Other	95	120	65	35	315
Group total	2,765	2,885	2,560	900	9,110
Age distribution as percent of group total	30.0	32.0	28.0	10.0	100.0
Southern					
Orange-Los Angeles	925	630	145	40	1,740
Ventura	125	255	130	0	510
San Diego	130	90	10	0	230
Other	55	25	25	5	110
Group total	1,235	1,000	310	45	2,590
Age distribution as percent of group total	48.0	38.0	12.0	2.0	100.0
State total	4,000	3,885	2,870	945	11,700[b/]
Age distribution as percent of state total	34.0	33.0	25.0	8.0	100.0

(Continued on next page.)

Table 6 continued.

a/ Alameda County is now listed separately but is included with the Santa Clara-San Benito grouping here for purposes of comparison. Sacramento, however, has now been included in "Other."

b/ Revised estimates for 1961 show the total acreage was actually 11,500 acres; for north central, 8,910; for south, 2,590.

Source: California Crop and Livestock Reporting Service, California Vegetables (Sacramento, April 12, 1961).

TABLE 7

California Strawberry Plantings: Percent of Age Distribution by Area, 1958-1962

California	Age distribution of plantings			
	First year	Second year	Third year	Fourth year and over
	percent			
North central				
1958	17	26	42	15
1959	25	20	26	29
1960	30	31	20	19
1961	30	32	28	10
1962[a/]	26	37	27	10
Southern				
1958	47	39	11	3
1959	61	27	11	1
1960	71	24	4	1
1961	48	38	12	2
1962[a/]	44	49	7	0
State total				
1958	21	28	38	13
1959	31	21	24	24
1960	38	30	17	15
1961	34	33	25	8
1962[a/]	30	40	22	8

a/ Estimated.

TABLE 8

California Strawberry Plantings: Percent of Area Distribution 1958-1962

Year	Total acreage	Acreage, north central California	Column 2 as percent of column 1	Acreage, southern California	Column 4 as percent of column 1
	1	2	3	4	5
1958	17,000	14,640	86.1	2,360	13.9
1959	13,200	11,130	84.3	2,070	15.7
1960	11,700	9,260	79.1	2,440	20.9
1961	11,500	8,910	77.9	2,590	22.1
1962	10,500	8,115	77.3	2,385	22.7

following the war, however, California's share of total national production became steadily more impressive. (A summary of strawberry production for the United States and for California in these postwar years is given in Table 9.) In 1955, when total national production of strawberries had exceeded prewar levels, California was supplying over one-third of the total United States production. This amounted to nearly four and one-half times the 1947 production figure for the state. However, peak 1956 California production was more than 10 times the 1942 strawberry production for the state, and in the two boom years of 1956 and 1957 California produced more than 40 percent of all strawberries grown in the United States. For the longer period, 1951-1960, which included the large production years, California produced over 36 percent of all strawberries grown in the United States for almost a decade (see Table 9).

For this period, no other state began to approach the dominant position of California for total strawberry production, although Washington and Oregon were still important producers. (Their competitive relationship to California production will be considered in Part IV.) California's outstanding production figure was, of course, the major factor in assigning the dominant position to the midspring grouping of states in the seasonal picture. It should be remembered, however, that California's harvest starts early and is unusually long, yet all figures are lumped in the midspring category, which may actually confuse the picture when competitive conditions are under consideration.

Utilization of Strawberries--Growth of Processing Market
California and the United States

Until the postwar years, a negligible fraction of California's strawberry production had gone into processing. With the exception of Washington and Oregon--and, in very small part, Louisiana and Virginia--we have seen this was characteristic of the nationwide industry as well. With the development of the frozen strawberry industry, the utilization shifted. California supplied a steadily larger proportion of all production for processing, almost entirely devoted to freezing. In its peak processing year of 1956, California's frozen strawberry pack was over 173 million pounds, frozen weight--more than 55 percent of a record-high national frozen pack of over 312 million pounds (see Appendix Table XII).

At this same time, over 50 percent of all strawberries produced nationally went into processing (see Table 10). California's proportion of the total

TABLE 9

Total Strawberry Production: California and United States
1942 and 1947-1962

Year	California total production	United States total production
	thousand pounds	
1942[a]	22,240	442,028
(War years)		
1947[a]	35,966	323,974
1948[a]	49,590	375,175
1949	50,908	311,900
1950	81,282	393,617
1951	88,113	405,414
1952	114,912	416,927
1953	152,938	427,631
1954	159,467	411,469
1955	166,740	446,716
1956	243,200	548,036
1957	223,560	550,638
1958	210,800	531,387
1959	170,280	477,674
1960	156,780	466,789
1961	204,700	510,238
1962	207,900	515,453
Average:		
1947-1951	61,178	362,016
1951-1960	168,679	468,268

a/ Estimates made in pounds, based on figures originally quoted in crates. The figures for 1947 and 1948 are those currently quoted by the U. S. Department of Agriculture. The California quotations are lower than those used in Part VI (see Table 25) by approximately 2 million pounds. See page 15 for full explanation of differences.

TABLE 10

California and United States Strawberry Production for Processing, 1949-1962

Year	United States production			California production				
	Total	For processing	Column 2 as percent of column 1	Total	Column 4 as percent of column 1	For processing	Column 6 as percent of column 4	Column 6 as percent of column 2
	1	2	3	4	5	6	7	8
	thousand pounds			thousand pounds		thousand pounds		
1949	311,900	92,127	29.5	50,908	16.3	7,786	15.3	8.5
1950	393,617	170,660	43.4	81,282	20.7	33,558	41.3	19.6
1951	405,414	144,246	35.6	88,113	21.7	33,796	38.4	23.4
1952	416,927	188,210	45.1	114,912	27.6	46,750	40.7	24.8
1953	427,631	212,955	49.8	152,938	35.8	81,226	53.1	38.1
1954	411,469	222,819	54.2	159,467	38.8	87,890	55.1	39.4
1955	446,716	259,293	58.0	166,740	37.3	102,340	61.4	39.5
1956	548,036	306,968	56.0	243,200	44.4	154,700	63.6	50.4
1957	550,638	267,858	48.6	223,560	40.6	105,300	47.1	39.3
1958	531,387	265,993	50.1	210,800	39.7	113,000	53.6	42.5
1959	477,674	240,901	50.4	170,280	35.6	74,000	43.5	30.7
1960	466,789	228,880	49.0	156,780	33.6	71,000	45.3	31.0
1961	510,238	221,549	43.4	204,700	40.1	72,200	35.3	32.6
1962	515,453	226,366	43.9	207,900	40.3	72,600	34.9	32.1

national processing market was over 50 percent in 1956 as compared to 8.5 percent in 1949. The increase in production of strawberries for processing, for the decade 1946-1956, is the most striking development in the California picture. The percentage of the California crop which went into processing continued to be impressive throughout the years following this growth decade, but only in the single year 1958 did it again exceed 50 percent of the total production of strawberries in California.

It is interesting to note that, among all the amazing growth statistics in the California strawberry industry, in 1956--the peak year for California production and for California production for processing--the amount of the crop which went into the processing channel--over 154 million pounds--was nearly 20 times greater than that for processing in 1949. As we have repeatedly indicated, the development of the frozen strawberry industry was responsible for this tremendous increase in California processing production. The pattern of processing increase is almost identical to the pattern of the total frozen strawberry pack. Although the figures are scattered and not too significant, Table 11 indicates the very small proportion of the California crop in recent years which has gone directly into jams, jellies, and other preserves, compared to the deliveries to freezers.

A survey of production trends for processed strawberries in this postwar period places California first in growth, first in absolute total production, and second only to Oregon and Washington combined in certain specific instances. During the processing growth period under discussion, therefore, the major area of comparable size was also on the Pacific Coast. This combination of Oregon and Washington is of such great importance to California's share of processing production in the nation that it warrants a separate discussion. This will be found in Part IV.

After noting the importance of the Northwest, the only other states which could be mentioned as providing a stable or significant percentage of commercial strawberries for processing would be Michigan and Tennessee (see Table 12). Michigan, which is classified as a late spring state in the same category as Oregon and Washington, has annually produced an average of 33-35 million pounds of strawberries since World War II. In the immediate postwar period, the share Michigan processors marketed of the total United States processing production averaged a little under 7 percent per year. Since the mid-1950's, however,

TABLE 11

California Strawberry Production for Processing, 1952-1962

Year	Deliveries to freezers[a]	Frozen-pack[b]	Percent of frozen-pack in retail packages	Jams and jellies	Total processing	Processing as percent of total crop
	thousand pounds			thousand pounds		
1952	46,081[c]	58,596	[d]		46,750	40.7
1953	78,715	93,682		2,500	81,226	53.1
1954	81,100	96,474		6,800	87,930	55.1
1955	97,607	119,505		5,000	102,340	61.4
1956	144,068	173,199	56.2	10,600	154,700	63.6
1957	97,860	118,305	52.4	8,100	105,300	47.1
1958	110,112	133,470	47.7	2,800	113,000	53.6
1959	70,072	82,939	34.7	4,000	74,000	43.5
1960	67,605	79,710	32.0	3,400	71,000	45.5
1961	69,655	82,939	34.7	3,300	72,200	35.3
1962[e]	72,881	85,285	33.5		72,600	34.9

a/ Fresh fruit, stemmed weight.

b/ Sugar included.

c/ Reported by approximately 95 percent of freezers that year.

d/ Blanks indicate no data available.

e/ Preliminary. Note that "deliveries to freezers" is apparently a higher figure than "total processing." It is suggested that final revision will raise the total processing estimate.

Source: California Federal-State Market News Service, Marketing California Strawberries, 1962 Season (San Francisco, 1963, and previous annual issues).

TABLE 12

Michigan and Tennessee Strawberry Production for Processing, 1947-1962

Year	Michigan production				Tennessee production			
	Total	For processing	Column 2 as percent of column 1	Michigan processing as percent of United States processing	Total	For processing	Column 6 as percent of column 5	Tennessee processing as percent of United States processing
	1	2	3	4	5	6	7	8
	thousand pounds				thousand pounds			
1947	31,680	a/			27,404	7,820	28.5	10.0
1948	28,658	7,310	25.5	5.2	29,138	14,450	45.6	10.0
1949	23,256	3,298	14.2	3.6	16,544	6,460	39.0	7.0
1950	36,288	19,584	54.0	11.5	19,458	14,960	76.9	9.0
1951	33,480	10,608	31.7	7.4	29,380	20,400	69.4	14.1
1952	35,640	13,260	37.2	7.1	26,429	21,012	79.5	11.2
1953	32,760	13,770	42.0	6.5	12,864	7,820	60.8	3.7
1954	23,436	9,180	39.2	4.1	13,552	9,010	66.5	4.0
1955	33,048	11,050	33.4	4.3	19,344	13,550	70.0	5.2
1956	33,600	15,400	45.8	5.0	35,735	33,000	92.3	10.6
1957	41,760	11,000	26.3	4.1	27,013	14,400	53.3	5.4
1958	43,200	7,460	17.3	2.8	31,500	25,000	79.4	9.4
1959	34,200	10,300	30.1	4.3	19,500	13,900	71.3	5.8
1960	36,480	12,500	34.3	5.5	22,720	16,220	71.4	7.1
1961	33,480	7,700	23.0	3.5	26,600	18,000	67.7	8.1
1962	38,950	10,900	28.0	4.8	10,560	6,000	56.8	2.7

a/ Blanks indicate **no data available.**

Michigan's share of the processed strawberry production has declined to an average 4-5 percent of the national annual total.[1/]

Tennessee is a producing area which markets in midspring, at the same time as California's major season.[2/] In the postwar boom period, Tennessee's total production was fluctuating, but after 1948 it was never as large an absolute amount as that of Michigan. In 1956--the peak year for processing in the United States--Tennessee did grow more strawberries than Michigan; in fact, her processed production was almost as great as Michigan's total production for all uses. But that year proved to be the single exception.

During that same postwar boom period, Tennessee's production of processed strawberries averaged a little over 8 percent of the United States total for processing despite constant fluctuations which seem to be characteristic of that state's production pattern. This share of the national processed strawberry production has continued in the postboom period, again with considerable annual variation. Tennessee indicated a strong leaning to the processing outlet during the growth period for processing, since over 60 percent of the total production went for that use every year from 1950 to 1955. In the peak year, 1956, over 90 percent of Tennessee's production was processed. Michigan, on the other hand, seems more diversified throughout, with less than half of her production utilized for processing.

When it is remembered that, during the period we are now discussing, California was producing an increasing share of the United States total, consistently growing from 20 to 40 percent of all processed strawberries, it can be recognized that neither Michigan nor Tennessee, with their individual productions of less than 10 percent of the national total, were strongly influential in the total picture. Nor could the position of either Michigan or Tennessee have been a significant factor in the readjustment period which followed 1956-57.

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1/ For a further discussion of Michigan's fresh and processed strawberry industry, see C. C. Dennis, "Strawberry Prices and Marketing Margins," Quarterly Bulletin, Vol. XLIII, No. 3 (February, 1961), pp. 648-659. (Michigan State University Consumer Panel Report No. 59.)

2/ For a more complete discussion of Tennessee's strawberry industry, see William E. Goble, Tennessee's Competitive Position in Producing and Marketing Strawberries, Tennessee Agricultural Experiment Station Bulletin 332 (Knoxville, 1961), 40p.

Signals of the End of the Boom in California

The end of this constant expansion in the frozen strawberry industry was presaged by the increasing cold storage holdings for the United States as a whole and a regional picture which showed the same phenomenon (see Tables 17 and 18 for the western regional strawberry pack and end-of-season carry-over for California, Oregon, and Washington).

The sharp curtailment in the freezing of strawberries in 1957 and the consequent dip in production going into processing are, of course, the major factors in the "readjustment" pattern in the industry, to which we will return. It is important to note here that, although the California average price per pound for strawberries in the processing outlet only ran higher than that for the fresh market strawberries for three years (1944, 1945, and 1946), it continued to seem favorably comparable to the fresh market price through 1954 (prices for each outlet were equal in 1950); and it was not until 1955-56 that an 8-cent differential in grower prices developed in California (see Table 13).1/

While some recovery in price brought a one-year increase in production for processing in California in 1958, total production continued to decrease; and 1959 showed a drop in production for processing of over 25 percent from the 1958 figure accompanied by an average price rise to growers of 2.3 cents per pound. This can be contrasted with the initial sharp drop of one-third in the total processing figure for California between 1956 and 1957 when a decrease of 3.6 cents average price per pound to growers accompanied the reduction. It also should be compared with the 1960 and 1961 experience with processed strawberries when the increase of slightly less than 1 million pounds in production for processing in the two years was accompanied by a reported average decrease of 4.6 cents per pound in average price paid to growers.

The extremely heavy production of strawberries in 1956, the overwhelming frozen strawberry pack of that year, the problems of a large carry-over into the 1957 season, and the consequent price decline throughout the industry brought repercussions for all segments of the strawberry industry that are now possible to assess more thoroughly from the point of view of five years' experience of readjustment. The period since 1957 in the California strawberry industry will be reviewed after a brief look at the more traditional fresh market for California strawberries.

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1/ But see the discussion (page 15 and following pages) of the different meaning of price quotations for fresh and processed strawberries.

TABLE 13

California Strawberry Production and Price for Fresh Market and Processing[a/]
1942-1962

	Total		Fresh market		Processing	
	Production	Average price	Production	Average price	Production	Average price
	thousand pounds	cents per pound	thousand pounds	cents per pound	thousand pounds	cents per pound
1942	22,240	12.0	22,240	12.0	0	0
1943	12,204	25.7	11,592	25.7	612	24.7
1944	7,515	23.8	6,665	23.7	850	24.7
1945	8,151	21.7	7,335	21.3	816	24.8
1946	16,776	27.2	13,478	26.5	3,298	30.0
1947	37,284[b/]	23.6	30,314	23.9	6,970	22.4
1948	51,348[b/]	21.0	40,434	21.7	10,914	18.2
1949	50,908	18.4	43,122	18.7	7,786	17.0
1950	81,282	20.0	47,724	20.0	33,558	20.0
1951	88,113	20.8	54,317	21.3	33,796	20.0
1952	114,912	18.4	68,162	20.0	46,750	16.0
1953	152,938	17.8	71,712	19.3	81,226	16.5
1954	159,467	19.0	71,577	22.6	87,890	16.0
1955	166,740	20.2	64,400	25.2	102,340	17.0
1956	243,200	16.9	88,500	22.1	154,700	14.0
1957	223,560	14.4	118,260	17.9	105,300	10.4
1958	210,800	15.6	97,800	20.1	113,000	11.7
1959	170,280	19.1	96,280	23.0	74,000	14.0
1960	156,780	20.1	85,780	24.1	71,000	15.3
1961	204,700	17.6	132,500	21.3	72,200	10.7
1962	207,900	17.6	135,300	20.8	72,600	11.5

a/ Price here referred to is season weighted average price to growers.

b/ Figures differ somewhat from those quoted in Table 9 because of difference in converting crates to pounds.

Strawberries in California--Fresh Market

While the processing growth was spectacular in California, the increase in volume in strawberries for the fresh market was also important. Here again, heavy yield and length of season, plus improved methods of refrigerated transportation, caused California to outdistance all other states in the nation in marketing fresh strawberries. By 1956, California produced 36.7 percent of the total national fresh strawberry crop distributed in the fresh markets of all sections of the United States (except the Southeast) and shipped to Canada as well. It should, of course, be remembered that the nationwide production for fresh market has never regained the absolute amounts so utilized in the prewar period. In large part, this can be attributed to the incursion of the processed channel for strawberries. But California so far outdistanced all other states in her share of the fresh market that existed in the postwar period that her production for the fresh market in 1956 was greater than all other midspring states combined. It was also greater than the combined production for fresh market of all early spring and late spring states.1/

Because of the consistently larger percentage of California production going into processing through the postwar years, California production for fresh market was not a steadily increasing percentage of the total national crop for this purpose (see Table 14); but the sharp drop noted in processing in 1957 meant that nearly 53 percent of the California crop went to fresh market channels. California's fresh market production figure of 118,260,000 pounds was close to 43 percent of a peak postwar United States fresh strawberry crop of over 275 million pounds and was reflected in the fact that more than 50 percent of the national crop went into fresh market channels for the first time since 1953. Michigan, with a fresh market production of over 30 million pounds was the only other single state producing considerable volume for the fresh market in 1957 (see Appendix Table III). With occasional exceptions, Michigan has been a steady supplier of approximately 10 percent of the total United States production of fresh strawberries for at least 20 years.

Michigan, it should be remembered, falls into the late spring group in the strawberry calendar. Louisiana, the third place candidate in supplying fresh

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1/ In the postwar period, Los Angeles and the San Francisco Bay area have become two of the largest fresh markets for strawberries in the nation and are supplied by California growers.

TABLE 14

California and United States Strawberry Production for Fresh Market, 1949-1962

Year	United States production			California production				
	Total	Fresh market	Column 2 as percent of column 1	Total	Column 4 as percent of column 1	Fresh market	Column 6 as percent of column 4	Column 6 as percent of column 2
	1	2	3	4	5	6	7	8
	thousand pounds			thousand pounds		thousand pounds		
1949	511,900	218,757	70.1	50,908	16.3	43,122	84.7	19.7
1950	393,617	222,957	56.6	81,282	20.7	47,724	58.7	21.4
1951	405,414	258,268	63.7	86,113	21.7	54,317	61.6	21.0
1952	416,927	226,717	54.9	114,912	27.6	68,162	59.3	29.8
1953	427,631	214,676	50.2	152,938	35.8	70,712	46.9	33.4
1954	411,469	184,402	44.8	159,467	38.8	71,577	44.9	38.8
1955	446,716	187,423	42.0	166,740	37.3	64,400	38.6	34.4
1956	548,036	241,068	44.0	243,200	44.4	88,500	36.4	36.7
1957	550,638	276,297	50.2	223,560	40.6	118,260	52.9	42.8
1958	531,387	264,694	49.8	210,800	39.7	97,800	46.4	36.9
1959	477,674	236,273	49.5	170,280	35.6	96,280	56.5	40.7
1960	466,789	237,909	51.0	156,780	33.6	85,780	54.7	36.1
1961	510,238	288,689	56.6	204,700	40.1	132,500	64.7	46.2
1962	515,453	289,087	56.1	207,900	40.3	135,300	65.1	46.8

strawberries, markets her product earlier in the year than Michigan but in close time proximity to the early season strawberries of southern California. Since 1957, a relatively steady fresh market supply of around 13 million pounds (approximately 5 percent of the United States total strawberry crop for fresh market) has been marketed by Louisiana; but, in 1953 and 1954, Louisiana marketed over 20 million pounds of fresh strawberries, and the 1956 recovery from the low-yield 1955 strawberry year in that state was productive of nearly 19 million pounds of strawberries, marketed fresh (see Appendix Table III).

Post-1957 Developments in the Fresh Market for California Strawberries

The increases in production of strawberries for the fresh market were not proportionally as large as those in the newly developed outlets for processed berries in California; thus, the decreases were not so great nor were the readjustments of such magnitude in the postboom years following 1957. While the tonnage going into processing outdistanced the fresh utilization during the boom period, the fresh market has again absorbed, on the average, more than 55 percent of all California strawberries produced since then.

California's share of the total United States production for fresh market has averaged over 35 percent since 1953, but in 1957 and 1959 California supplied something over 40 percent of the total United States fresh market crop. Although fluctuation has marked fresh market strawberry production both in California and in the United States during the last two years of increased strawberry production, California has exceeded all previous records for fresh strawberries and marketed over 46 percent of all fresh strawberries grown in the United States.

Fresh Market Production Trends in the 1960's--California and the United States

Having shown a definite decline in total production every year since 1957, producers of California strawberries once again demonstrated their abundant supply, and over 200 million pounds were marketed for all uses in 1961. Perhaps the most striking change in this strawberry crop was the fact that nearly 65 percent of the total was sold on the fresh market. In 1962 over 65 percent of California's continuing increased production went into fresh market channels. The period of 1961-62 was one of even greater absolute United States production of strawberries for fresh market than any of the boom years of the 1950's, even though total production for all uses was nearly 10 percent less than that of 1957.

California produced a harvest of fresh strawberries more than 10 percent greater than the state ever marketed fresh before. The yield figure for the two years, which averaged nearly 19,000 pounds per acre, also sets a new record.

Additional Competitive Areas of Fresh Strawberry Production

Two new developments in the fresh market for strawberries are of possible interest to California producers as the fresh market utilization of the total production becomes greater. We mention them here briefly for further investigation and analysis in the future.

1. In addition to Louisiana, which now markets fresh strawberries in competition with the earliest southern California growers, Florida, which produces a winter crop earlier than both, is increasing production (see Table 15). Furthermore, Arkansas, which is a midspring state and therefore parallels California's major marketing season, showed a tendency through 1961 to return to a production level of around 12 million pounds in the post-1957 period. The dry season experienced in 1962 reduced production to nearly 9.5 million pounds, but indications are this was a temporary setback. Florida and Louisiana are strictly fresh market areas, with more than 90 percent of their production channeled in that direction, while Arkansas has, in general, shipped approximately 75 percent to the fresh market. Therefore, as far as the competitive position of California growers is concerned, Florida and Louisiana developments are of possible importance in influencing price determinations, with their early season marketing period. Arkansas, although marketing during the same period as California, may be less influential.

2. Although Mexican strawberry shipments to the United States have been in large part frozen berries up to the present, all indications are that fresh strawberry importations can be expected to increase. The direct competition of Mexican fresh strawberries, shipped through Nogales to the southern California market, must be anticipated by California growers. (See page 69 for further discussion of Mexican strawberry import competition.)

Season Average Price to Growers Favors the Fresh Market in California

The quoted price differential between price to growers for fresh market and for processing was relatively small from 1950 through 1953, actually being

TABLE 15

Strawberry Production, Selected States: Fresh Market, Acreage Harvested and Yield Per Acre, 1957-1962

Year	Florida[a]			Louisiana[b]			Arkansas[c]		
	Fresh market	Acreage harvested, all uses	Yield per acre, all uses	Fresh market	Acreage harvested, all uses	Yield per acre, all uses	Fresh market	Acreage harvested, all uses	Yield per acre, all uses
	thousand pounds	acres	pounds	thousand pounds	acres	pounds	thousand pounds	acres	pounds
1957	5,422	3,600	1,700	13,240	7,600	1,900	10,850	6,800	2,000
1958	2,097	2,600	1,300	13,250	6,700	2,100	14,400	7,000	2,800
1959	3,133	1,500	2,200	12,841	6,500	2,200	13,400	7,000	2,700
1960	6,538	1,400	5,100	13,982	6,900	2,100	12,680	6,800	2,600
1961	7,756	1,800	4,800	13,665	6,800	2,200	12,080	6,400	2,700
1962	13,451	1,900	7,100	15,093	7,800	2,200	9,450	6,300	1,500

a/ Winter.

b/ Early spring.

c/ Midspring.

Sources:

1957-1961: California Federal-State Market News Service, Marketing California Strawberries, 1961 Season (San Francisco, 1962), 56p.

1962: U. S. Statistical Reporting Service, Vegetables--Fresh Market, July 10, 1963, 32p.

quoted as equal in 1950.[1] In 1954 the quoted price differential favored the fresh market by 6.6 cents; on the average, from 1955 through 1958, the published annual average price to growers favored the fresh market by approximately 8 cents. In 1959 and 1960, while over 50 percent of California's strawberry crop was sold in the fresh market, the price favored that utilization by nearly 9 cents per pound. The year 1961 showed the largest price spread yet experienced in California. Fresh strawberries returned over 10 cents per pound more to growers than the processed berries (see Table 13).

The further implications of price differentials under changing utilization and the various other factors involved in the pricing of California strawberries will be the subject of Part VI of this report. It is evident at this point that there is still considerable uncertainty and room for fluctuation in the strawberry industry in California, however the product is used.

1/ See pages 13-14 for the problem of quoted price comparisons.

IV. The Competitive Position of California's Processed Strawberries and the Post-1957 Period

From a rapid glance at California and Northwest production figures in the postwar period (Table 16) and a quick recall of previously summarized national figures (see Part II and the Appendix tables), it is clear that the Oregon and Washington area is the only section of the country in major contention with California in the production of strawberries for processing in the postwar years.

Since we have already shown that strawberries for processing were a major influence in the rapid postwar growth in strawberry production and have clearly indicated the role of strawberries for freezing, it now follows that our further discussion of the developments in the frozen strawberry industry in California and post-1957 adjustments in processed strawberries in the state will be conducted in the context of relationships within the Pacific Coast.

Thus, we will cover first California and Northwest comparisons in production and share of the processed market and indicate regional as well as national frozen pack and end-of-season holdings for the postwar period. In this setting, we will view post-1957 developments in processed strawberries and in the frozen strawberry industry and conclude with a brief discussion of the Mexican strawberry industry. In this manner, we will have surveyed California's position in the full regional situation and the processed strawberry industry as it now seems to be developing.

California and the Pacific Northwest--Comparative Production Trends

Perhaps because of the rapid ascension of California to the role of primary producer of strawberries in the United States and its dominant position in both the fresh and processing market, there may have been a tendency to forget the importance of California's relationship to other strawberry-producing states in the years of explosive growth. The development of the frozen strawberry industry definitely led to the possibility of economic competition on a different scale and in a different manner than the considerations previously underlying the seasonal fresh market situation for strawberries.

The most important consideration viewed under these new circumstances is the relationship to other strawberry-producing areas in the Pacific Northwest. While California's growth has been spectacular in its total impact, Oregon and Washington have a long-run important position in the processing field and have steadily increased their share in this segment of the industry in the postwar

TABLE 16

California and Northwest Strawberry Production for Processing and Fresh Market
1947-1962

Year	Total		Processing		Fresh market	
	California	Northwest	California	Northwest	California	Northwest
	thousand pounds					
1947[a/]	37,284	51,864	6,970	45,492	30,314	6,372
1948[a/]	51,348	86,158	10,914	80,614	40,434	5,544
1949	50,908	65,664	7,786	58,378	43,122	7,286
1950	81,282	66,452	33,558	60,214	47,724	6,238
1951	88,113	52,830	33,796	46,682	54,317	6,148
1952	114,912	89,346	46,750	82,110	68,162	7,236
1953	152,938	105,915	81,226	97,750	71,712	8,165
1954	159,467	102,733	87,890	94,588	71,577	8,145
1955	166,740	122,745	102,340	115,294	64,400	7,451
1956	243,200	80,353	154,700	76,525	88,500	3,828
1957	223,560	133,900	105,300	124,300	118,260	9,600
1958	210,800	109,140	113,000	101,800	97,800	7,340
1959	170,280	135,120	74,000	127,900	96,280	7,220
1960	156,780	118,350	71,000	112,100	85,780	6,250
1961	204,700	114,600	72,200	108,180	132,500	6,420
1962	207,900	132,700	72,600	125,500	135,300	7,200

a/ Converted to pounds from official figures originally published in crates.

years. The trend toward the concentration of strawberry production in the Pacific Coast states has been of major importance in the postwar years, with California, Oregon, and Washington ranking first, second, and third in national production since 1953.[1] In 1949 the combined production of the three states was 37.7 percent of the national total, but by 1955 the three states had increased their combined share to 64.8 percent of the total United States production. Although the bad freeze had severely curtailed the Washington crop in 1956, California's increase kept the combined volume of the three states just over 59 percent of the United States total; and by 1957 Washington again ranked third (just barely ahead of Michigan) in the nation, and the three states combined accounted for nearly 65 percent of the national production figure (see Appendix Table II).

From an economic standpoint, it is quite reasonable to classify Oregon and Washington together, since their harvest season and their utilization pattern are roughly identical. Washington is somewhat more subject to climatic problems, but, even though Oregon dominates the pair in acreage and production, Washington's yield per acre had traditionally exceeded that of Oregon (see Appendix Tables II and V).[2] While neither state compares in yield per acre to California's figure, both states consistently outdistance all other contenders, with the occasional exception of Michigan and the high yield obtained by Florida in the last three years.

The rate of growth of total strawberry production in California was much more rapid than that of the Northwest, but Oregon was an established large producing state for a longer period. The unique feature of the Northwest production as compared to that of California is that it has been channeled almost entirely into the processing market. In the prewar period, preserving and freezing for the ice cream industry were the permanent processing demands in the Northwest. Since World War II, however, quick-freezing demand is the most important factor.

1/ With the exception of 1956, when Washington's crop failure allowed Michigan to regain third place as in prewar and immediate postwar years.

2/ Oregon has shown marked acreage increase over the prewar period and during the postwar decade, but Washington has held its acreage figure relatively steady with very slight absolute increase.

In the prewar period, Oregon was a more important strawberry-producing state than California and continued to have a larger share of the national strawberry production than California through 1948. In that year, Oregon led the United States in total production of strawberries for the last time; since then, it has held its position second to California, with the single exception of 1951.[1] During the prewar period, Washington's production had been somewhat smaller than California's and anywhere from one-half to two-thirds the size of the Oregon crop. The big jump in Washington production came after 1951, and by 1953 it had replaced Michigan as the third biggest producer in the United States. After a severe freeze and consequent drop in production in 1956, Washington was again third in 1957, with 7.7 percent of the total United States crop--less than one-half the size of Oregon's production and one-sixth the size of California's but slightly greater than that of Michigan (see Appendix Table II).

Oregon and Washington are both classified in the late spring grouping, with the peak harvest period in late May and June. Thus, they slightly overlap the north central California first harvest period and are generally completely harvested before the second peak period for north central California. Since California's processing season runs from the middle of April through mid-November (in 1956 it was 34 weeks in duration), Washington and Oregon processing is in the middle of California's season, with Oregon's mid-May to mid-July processing season the second longest in the United States.[2]

California-Northwest Comparisons in Processed Strawberry Production

Although the frozen strawberry industry presented a new and stabilized outlet for the seasonable, perishable crop, nonetheless, the competitive position of each producing area must be measured in terms of relationships to other processing areas; in this sense California's relationship to the Northwest is particularly important.

Washington and Oregon, as we have seen, produced over 80 percent of all strawberries for processing in the prewar period. At this time, California

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1/ Michigan was second in production that year, with a total of nearly 33.5 million pounds.

2/ North Carolina, however, which is classed as a midspring state, processes berries nearly as long--in general, from mid-May to the end of June.

production was almost entirely for the fresh market. In the immediate postwar period, as California entered this new field, the Washington-Oregon proportion of the market had not regained prewar levels but still averaged over 60 percent. By 1950, when California was unchallenged as top strawberry producer in the United States with over one-fifth of the total national production, Oregon processed more strawberries than California (41 million pounds as opposed to California's 33.5 million pounds) and, combined with Washington, processed nearly double California's processed production. Although Washington and Oregon in combination continued to outdistance California in processing with the exception of 1956 and 1958, California's tremendous increase brought her processed production very close to the total of the two Northwest states during the entire boom period.

Post-1957 Developments in the California-Northwest Relationship

While California's total production of strawberries was expanding so rapidly, the factor that increased the importance of the relationship to the Northwest production of strawberries was the "explosive" growth of the production of strawberries for processing, that is, the percentage of the total California crop that was utilized principally by freezers.

Washington and Oregon were, after all, the major producers of processed strawberries in the United States, and, while they continued to be the largest volume producers as a team, the California processed production not only brought it into close contenion on the Pacific Coast but the large increase in total United States volume was caused as much by California increases as by those of the Northwest, which was also rushing to supply the increased freezers' demand.

Probably the most important difference between California's strawberry industry and that of Oregon and Washington is that the latter area is established almost exclusively as producing strawberries for processing. For a variety of reasons, it does not shift "in midstream," as it were, and increase the shipments to fresh market if the processors' price is considered unsatisfactory, nor does it look to the fresh market for "quality sale" and higher price and delegate the rest of the production to processing.

Therefore, as the production statistics show, processing utilization is of paramount importance in the Northwest strawberry industry, and the price stipulations and planning of the Northwest growers must be shaped accordingly. As we have seen, California's season for processing strawberries "brackets"

that of the Northwest, so it is not at all impossible that the price relationship between the two areas of the Pacific Coast could be peculiarly interrelated and that this relationship could, in turn, be particularly affected by the fresh market price in California and the percentage of the total strawberry production in California which went into fresh market channels. We shall turn to this subject in Part VI.

For the moment it is interesting to note in speaking of this special relationship that the "period of adjustment" we have discussed with reference to California was not particularly characteristic of the Northwest strawberry industry. Acreage did decrease but not precipitously; total production tended to fluctuate rather than decrease; yield was satisfactory but not spectacular; thus, production for processing in the Northwest has more or less retained the gains of the boom period of the 1950's.

As California's production for processing decreased in total amount and in proportion to the United States total, the predominance of Oregon and Washington in processed strawberries has been reasserted. As California has shifted larger percentages of strawberry utilization to the fresh market, one might hazard the guess that the Pacific Northwest has had an opportunity to consolidate its position as a stable supplier of strawberries for processing.

The Post-1957 Readjustment Period in Strawberries for Freezing

California's strawberry production going into processing took a precipitous drop in 1957 and after a rally in 1958 has been more or less stable at a level of somewhat less than 70 million pounds, delivered to freezers, representing a frozen pack of 80 million pounds or more.

The decline in production going into freezing in California has meant that a smaller percentage of the United States total frozen pack has been attributable to California than to the Northwest since 1959. The percentage of the total United States frozen pack produced in the West, however, has remained above 80 percent. In 1962 nearly 55 percent of the total United States pack of frozen strawberries was attributed to the Northwest. Their performance in strawberry utilization is therefore of unique importance in California's analysis of future price and production patterns, which we shall discuss in Part VI.

The end-of-season cold storage holdings, which are indicative of the carryover from the previous season in frozen strawberries, continue to be a factor of importance in the readjustment of the processing strawberry industry.

The 1957 nationwide carry-over was such a startling figure that there is no doubt that the 1956-57 complex (crop and carry-over) exerted an important price influence.

Since end-of-season carry-over is relevant to an understanding of industry trends and gives an indication of the pattern of present and future developments, we have noted Pacific Coast figures in addition to the national cold storage figures (see Table 17).

Although the end-of-season cold storage holdings have been reduced nationally from the huge 1957 figure as the total United States frozen pack has declined, the Pacific Coast end-of-season holdings were slower to achieve a proportional reduction in the western share of this total. In fact, the regional holdings reached a peak carry-over in 1960. The Pacific region, which used to hold less than one-fourth of the nation's carry-over in warehouses, more recently has held anywhere from one-third to one-half of that total.

Nonetheless, it is scarcely realistic to consider the regional figure as a separate influence, since frozen strawberries move freely throughout the country wherever storage facilties are available. Many factors, including the building of additional storage facilties in the West added to revised buyer-seller arrangements for holding inventory, may account for the change.

Frozen Strawberry Production--Current Trends, United States and Pacific Coast

If we now summarize the trend in frozen strawberry production on the basis of all available information as currently viewed (see Table 18), there are several interesting observations.

1. United States frozen-pack: The fluctuations in production of frozen strawberries, marked by overall increases throughout the early 1950's, culminated in a single year, 1956, in a pack of over 300 million pounds. The downward adjustment, although intially precipitous and still fluctuating, seems to have reestablished a level of production around 230 million pounds for the past few years.

2. California frozen-pack: California's fluctuations in frozen strawberry production have been even more pronounced than those of the United States as a whole. In the five years after the 1956 peak, California's frozen-pack had fallen more than 50 percent. Since 1960, however, annual increases have been recorded for California frozen strawberries, and for the past two years California

TABLE 17

End-of-Season Change in Cold Storage Holdings[a/]
United States and Pacific Coast, 1956-1962

Year	United States	Pacific Coast	Column 2 as percent of column 1
	1	2	3
	thousand pounds		
1956	64,995	18,078	35.9
1957	102,346	32,765	32.0
1958	84,201	30,679	36.4
1959	88,659	39,271	44.3
1960	84,648	42,649	50.4
1961	89,486	31,306	35.0
1962	76,571	26,098	34.1

a/ End of April is considered end of season.

TABLE 18

Frozen Strawberry Pack: Percent Change for the United States California, Northwest, and Pacific Coast, 1956-1962

Year	United States		California		Northwest		Pacific Coast	
	Frozen-pack total	Annual change	Frozen-pack total	Annual change	Frozen-pack total	Annual change	Frozen-pack total	Annual change
	thousand pounds	percent	thousand pounds	percent	thousand pounds	percent	thousand pounds	percent
1956	312,293		173,199		81,951		255,150	
1957	260,864	-16.5	118,305	-31.7	112,787	+37.6	231,092	- 9.4
1958	269,647	+ 3.4	133,470	+12.8	95,462	-15.4	228,932	- .9
1959	248,253	- 7.9	82,939	-37.9	127,797	+33.9	210,710	- 8.0
1960	231,759	- 6.6	79,710	- 3.9	115,471	- 9.6	195,181	- 7.4
1961	222,694	- 3.9	81,140	+ 1.8	106,868	- 7.5	188,008	- 3.7
1962	234,620	+ 5.4	85,285	+ 5.1	127,845	+19.6	213,130	+13.4
Percent change, 1956-1962		-24.9		-50.3		+56.0[a/]		-16.5

a/ The Northwest decrease between 1959 and 1961 was 17 percent; but with the strong recovery in 1962 in Northwest frozen pack, the relative change from 1956 to 1962 is 56 percent.

has packed slightly above 30 percent of the United States total. Elements of leveling off in California's frozen strawberry production at a pack of around 82 million pounds seem prevalent during the last four years.

3. Northwest frozen-pack: The peak production in frozen strawberries did not occur in the Washington-Oregon area until 1959. Although substantial annual decreases followed, 1962 found the area packing almost the identical poundage as in 1959. By 1962, however, because of nationwide decreases, the Northwest pack was more than 54 percent of the United States total. This was, in turn, a pack nearly 50 percent greater than that of California.

4. Pacific Coast frozen-pack: In combination, therefore, California, Oregon, and Washington have shown a steadily decreasing frozen strawberry pack from a high in 1956 of 255 million pounds. This decrease, although it is over 25 percent for the period 1956-1961, was still not as great as the overall national decrease. This would indicate that, even though declining in total, the western region was further solidifying its position as the major supplier of frozen strawberries for the nation, and the Northwest was further reestablishing its major role. This trend was magnified this past year. The year 1962 marked the first reversal in the annual decrease of the total Pacific Coast frozen strawberry pack during the adjustment period, so that the West packed over 90 percent of all frozen strawberries produced in the United States this last year.

Domestic Movement of Frozen Strawberries in Recent Years

From the point of view of the industry, there seems no doubt that carry-over stocks have been a serious problem since 1956. In order to gain more perspective, Table 19, showing United States frozen strawberry stock, pack, imports, and estimated domestic movement, has been developed. Unfortunately, the limitations of the table make it indicative rather than definitive, but it is as accurate as it can be made under the constraints of the available data. The observations made from this table reinforce the conclusions reached by other available means. Total domestic movement of frozen strawberries for the United States as a whole increased steadily from 1947 to 1957 and then decreased steadily for the following three years. In 1961 available data indicated a temporary upturn in domestic movement.

In the context of the readjustment period, therefore, several tentative indications are suggested:

TABLE 19

Domestic Movement of Frozen Strawberries: Stock, Pack, and Imports
United States, 1947-1963

Year	End-of-season carry-over[a]	Frozen-pack	Imports	Total supply	Total domestic movement[b]
	thousand pounds				
1947	17,675	109,036	[c]	126,711	110,803
1948	15,908	160,077		175,985	139,615
1949	36,370	107,603		143,973	132,896
1950	11,077	193,771	4,501	209,349	159,490
1951	49,859	157,942	6,346	214,147	172,653
1952	41,494	206,635	6,990	255,119	209,691
1953	45,428	227,605	8,057	281,090	229,547
1954	51,543	227,135	10,881	289,559	248,926
1955	40,633	276,180	12,011	328,824	263,829
1956	64,995	312,293	11,454	388,742	286,396
1957	102,346	260,864	13,754	376,964	292,763
1958	84,201	269,647	14,518	368,366	279,707
1959	88,659	248,253	14,414	351,326	266,678
1960	84,648	231,759	27,026	343,433	253,947
1961	89,486	222,694	31,793	343,973	267,892
1962	76,571	234,620	33,517	344,708	261,274[d]
1963	79,434[d]				

a/ End of April is considered end of season.

b/ Including exports. (Since United States export figures are not separately available for frozen strawberries, they cannot be deducted from total movement to give a truly "domestic" figure. For the fiscal years 1957-58 to 1960-61, inclusive, the export of "frozen fruits" as a whole was known to average approximately 10.5 million pounds annually. These exports are believed to be, in large part, frozen strawberries. See page 66 for further discussion.)

c/ Blanks indicate data not available.

d/ Subject to revision.

1. Total domestic movement, based on the past four years' figures, may be leveling off at or near 260 million pounds.
2. End-of-season (April 30) stocks continue to run above 30 percent of total annual pack despite pack decreases or fluctuations.
3. Total supply has been relatively stable for the past three years despite differences in its composition.
4. Imports have continued to increase slowly, after having nearly doubled between 1959 and 1960.

With point 4, we add one more facet to our supply pattern. Although the following and final section of this part deals more specifically with frozen strawberry imports and their possible importance to the California producers, we should note one or two further points from Table 19 in this regard.

Imports and Exports of Frozen Strawberries

First, there was a definite sudden increase in importation of frozen strawberries in 1960 and 1961 for the United States as a whole. These came in very large part from Mexico (to be discussed later in this part). The imports of frozen strawberries had been slowly increasing during the 1950's but had been at almost the same figure for 1958 and 1959--about 14.5 million pounds.1/ In 1960, however, imports of frozen strawberries dramatically leaped by 87.5 percent, accompanied by a decrease in total United States pack and total domestic movement, thus emphasizing their role, however small in actuality, in the industry. In 1961 the increase in imports was smaller (17.6 percent over 1960), but it was coupled with an upturn in domestic movement and a decrease from 1960 to 1961 of about 4 percent in the total United States frozen strawberry pack. This again drew attention to the size of the imports into the United States, which by this time had more than doubled since 1959.

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1/ The classification given in United States import compilations is numbered 1330190, "Berries, n.e.s., frozen." See U. S. Bureau of the Census, United States Imports of Merchandise for Consumption, Report No. FT 110, monthly issues. These are known to be, in large part, frozen strawberries, particularly those imported from Mexico.

A second classification, 1330230, "Berries, otherwise prepared or preserved, n.e.s.," also with recorded imports from Mexico, is said to be largely strawberries, slightly cooked and packed in wholesale containers. This category has not, to our knowledge, been given particular attention as yet but could be explored for its relationship to domestic trade.

Before jumping to conclusions as to the importance of this observation, it is imperative to remember that the total import figure is a relatively small proportion of the total United States supply. Even in 1961, it was less than 10 percent. Also, because of the imperfections of data collection, we have no available published official figures to show United States exports of frozen strawberries during these years. Exports from the United States are aggregated in a category entitled "frozen fruits," and, although this category has remained at a quite stable level of export since 1957, there is no immediate way of knowing how frozen strawberries have fluctuated as a part of this total since that time.[1/] It is possible to say, generalizing from Canadian data, noted later, that Canada imported an amount of frozen strawberries in 1958 and 1959 which would seem to have been roughly half the total of frozen fruits exported by the United States. And we also know that Canada's imports of United States frozen strawberries have dropped nearly 50 percent in the last two years (1960 and 1961). Whether frozen strawberries have been shipped to other substitute markets is not, at present, known. This may well warrant further exploration when more specific export data are made available to the researcher.

The Mexican Frozen Strawberry Industry--A Threat?

A "bête noire" in the opinion of some parts of the strawberry freezing industry, and on the part of some growers, has been the growth of strawberry production in Mexico and some increase in the importation of Mexican frozen strawberries into the United States. In addition, there is considerable evidence that Mexican frozen strawberries are strongly competitive and, in fact, displacing some imports from the United States in the Canadian market.

There is considerable difficulty in obtaining official data which will either substantiate or refute the claim of certain California producers and processors that the Mexican strawberry industry constitutes an important economic threat. An interesting discussion of the emergence and growth of strawberry production in Mexico can be found in reports of our agricultural attachés over the past decade.[2/] The acreage, yield, and production (see Table 20) give

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1/ See Sidney Hoos, The European Common Market, Trade Expansion Act and California Agriculture (Berkeley: California Agricultural Experiment Station, 1962), Table 9, pp. 61-63.

2/ The most recent appeared in U. S. Foreign Agricultural Service, Foreign Agriculture, Vol. I, No. 33 (August 19, 1963), 16p.

TABLE 20

Mexican Strawberries: Acreage, Yield, and Production, 1952-1961

Year	Acreage	Yield per acre	Total production
	acres	pounds	thousand pounds
1952	1,900	4,400	8,400
1953	2,700	2,600	7,200
1954	3,200	4,400	14,200
1955	4,000	4,400	17,600
1956	6,500	3,000	19,800
1957	8,200	3,200	27,000
1958	10,500	3,800	39,600
1959	12,400	3,400	42,000
1960	13,600	3,600	48,600
1961[a/]	15,600	3,400	53,000

a/ Estimated.

Source: California Federal-State Market News Service, Marketing California Strawberries, 1961 Season (San Francisco, 1962), 56p.

a relatively accurate picture of the current state of the industry. Based on these figures, we see that the acreage has increased by one-third since 1958; currently, it can be estimated that the acreage harvested in Mexico almost equals that harvested in California in 1958. California, on the other hand, now harvests an acreage that approximately equals the acreage harvested by Mexico in 1958. However, any possible comparison with California stops with acreage figures. The estimated yield of Mexican berries is more comparable to that found in Michigan than it is with any Pacific Coast growing area. Total production, however, seems to indicate a rough comparability in size to Washington as a strawberry producer.

Although the initiation and growth of the Mexican strawberry industry could well be a fascinating story in itself, we can only summarize it briefly here. According to United States reports, the first strawberry freezing plant was established in Irapuato, northwest of Mexico City, in 1948.[1/] From this beginning there has been a phenomenal growth and expansion in the last decade emphasizing exports of frozen berries. Strawberries are grown commercially in over half the Mexican states; berries for export, however, have been grown and frozen, in large part, in the two states of Guanajuato and Michoacan.

As an example of Mexican growth and procedures in the strawberry industry, a large-capacity modern packing and freezing plant was built in 1960 with United States and Mexican capital and joint supervision in Morelia, Michoacan.[2/] It was suggested that the place of construction illustrated the evident shift in the strawberry-producing center from the Bajio to Michoacan. Additional plants are planned, or under way, packaging other fruits and vegetables during the six-month off-season, even though designed principally for strawberries.

In general, Mexican strawberries are frozen and exported largely for the industrial market in the United States and Canada. This involves 30-pound cans and shipment either by refrigerated railcar or truck-trailer. Inspection at the border is done by both the U. S. Department of Agriculture and the Food and Drug Administration.

1/ U. S. Foreign Agricultural Service, Foreign Agriculture Circular, FDAP 1-61, May, 1961, p. 1.

2/ Edgar M. Huymans, "Modern Freezer for Mexico," Canner/Packer (Western Edition), Vol. CXXIX, No. 9 (September, 1960), pp. 24 ff.

The planting season in the Mexican area of immediate interest is generally from August to mid-September, with picking getting under way in frost-free years as early as January and lasting through June. Normally, picking can be counted on by February, at least, and a "very good" year would find harvesting continuing into August. This would indicate a season somewhat earlier than southern California, more parallel to Florida. Growers under contract to processors receive loans to meet costs of planting and cultivation and have largely shifted to the Klondike variety to supply a more suitable berry for freezing. It is said that newly developing acreage in two northern states of Mexico is planned for expansion of commercial marketing of fresh strawberries for which a growing market is being found within Mexico itself. The Klondike variety of strawberry has also proved highly successful as a fresh market product in flavor, appearance, and "keepability." Florida 90, Solana, and Larsen varieties are also grown and marketed successfully. Investment in this additional acreage development is attributed also to American capital, in considerable part from Texas.

The rapid growth of imports into the United States from Mexico is illustrated in Table 21. Figures for frozen strawberry imports are approximate, since the category officially reported is "frozen berries." However, it is known that nearly all frozen berries from Mexico are strawberries.

Fresh strawberry imports into the United States from Mexico are also on the increase, although the amount is still a very small proportion of any winter crop grown in Florida where the marketing season would be considered comparable. In the past, these have gone mostly through Texas to the eastern markets, but increases are being noted in the Nogales customs entry point, which seem to indicate California as a prospective market.

Frozen strawberry imports into Canada are a matter of further interest. As we see in Table 22, the Canadian imports from the United States, according to the U. S. Foreign Agricultural Service, have been a small but at least noticeable, if not stable, fraction of the United States production of frozen strawberries over the immediate past. Canadian frozen strawberry imports coming from Mexico would seem to be increasing rapidly in the last few years while those from the United States are possibly declining by a similar total amount, though not an equal proportion.

Accurate official information for United States exports and imports of frozen strawberries cannot be compiled, since "frozen strawberries" as a

TABLE 21

United States Imports of Fresh and Frozen Strawberries by Country
1949-1962

Year	Fresh				Frozen[a]	
	Mexico	Canada	Bahamas	Total	Mexico	Total[b]
	thousand pounds					
1949	c/	3,093		3,093		
1950		7,612		7,612	3,105	4,501
1951		3,347		3,352[b]	5,619	6,346
1952		5,906		5,918[b]	5,932	6,990
1953		5,187		5,188[b]	4,771	8,057
1954		1,008		1,008	8,985	10,881
1955		382		382	11,665	12,011
1956		102		102	11,250	11,454
1957		6		6	13,709	13,754
1958	4	5		9	14,367	14,518
1959	51	33	123	207	14,064	14,414
1960	562	155	3	720	25,017	27,026
1961	579	124		704	29,817	31,793
1962	895	93		988	32,281	33,517

a/ Reported as "frozen berries"; nearly all frozen berries from Mexico are known to be strawberries.

b/ Includes amounts from other countries.

c/ Blanks indicate no imports listed.

Sources:

1949-1955 and 1961-62: U. S. Bureau of the Census, United States Imports of Merchandise for Consumption, Report No. FT 110, annual issues. Frozen berries are classified as 1330190, and fresh strawberries are classified as 1312300.

1956-1960: U. S. Foreign Agricultural Service, Foreign Agriculture Circular, FDAP 1-61, May, 1961, p. 2.

TABLE 22

Canadian Imports of Fresh and Frozen Strawberries
from the United States and Mexico
1956-1962

Year[a/]	From the United States		From Mexico
	Fresh	Frozen	Frozen
	thousand pounds		
1956	15,212	7,078	665
1957	20,249	3,936	660
1958	20,431	6,798	1,103
1959	19,292	5,288	1,945
1960	18,256	3,007	3,255
1961	25,139	2,978	3,934
1962	21,277	2,545	4,614

a/ Calendar years.

Sources:

1956-1960: U. S. Foreign Agricultural Service, Foreign Agriculture Circular, FDAP 1-61, May, 1961, p. 3.

1961-62: Canada Bureau of Statistics, Trade of Canada: Articles Imported from Each Country (Ottawa, quarterly cumulative).

Idem, Imports by Commodity (Ottawa, monthly cumulative).

category is not specified in trade statistics as such. The classification "frozen berry, not elsewhere specified" (1330190) used in United States import statistics is relatively close, but United States export statistics lump frozen strawberries in a category classified as "frozen fruits" (13200).[1] Although it is known that Canada is the major importer of frozen fruits, taking annually over three-fourths of the United States exports so classified, it is not possible to specify from United States data what percentage of this total is attributable to frozen strawberries. Therefore, only by using Canadian trade statistics, where frozen strawberries have been noted specifically since 1955, are we able to gain a more accurate picture of the relation between United States and Mexican frozen strawberry exports to the Canadian market (see Table 23). Total Canadian imports of frozen strawberries have remained relatively stable in the last four years. During that time, however, the United States total exports of frozen strawberries to Canada have decreased nearly 50 percent, with Mexico assuming the role in the last two years of major supplier of this product.

A more striking picture is observed, however, when the category "frozen strawberries" is further refined, as is done in Canadian import trade statistics. If the breakdown is noted between retail and institutional frozen-pack for the United States and Mexico, we see that Mexico exports frozen strawberries exclusively in industrial size, 30-pound pack, which United States figures do not show but which can be assumed to be known in the industry itself. Since there seem to be no specific tariff constraints against retail size as opposed to institutional pack importation in either the United States or Canada,[2] cost

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1/ U. S. Bureau of the Census, Schedule A: Statistical Classification of Commodities Imported into the United States, 1960, 1034p., and U. S. Bureau of the Census, Schedule B: Statistical Classification of Domestic and Foreign Commodities Exported from the United States, 1958, 1143p.

2/ The United States tariff rate, under the effective GATT agreement, is currently 14 percent ad valorem. See U. S. Bureau of the Census, Schedule A: . . . , p. 108. Canadian tariff on frozen berries is currently 2 cents per pound. See Canada Department of Agriculture, Economics Division, Canada and the United States Tariffs on Selected Agricultural Products (Ottawa, January, 1963), p. 15.

TABLE 23

Canadian Imports of Frozen Strawberries from the United States and Mexico
1955-1961

Year	Total from United States	Column 1 as percent of column 5	Total from Mexico	Column 3 as percent of column 5	Total imports[a]
	1	2	3	4	5
	thousand pounds		thousand pounds		thousand pounds
1955	1,939	54.0	[b]		3,589
1956	6,778	87.5	665	8.6	7,745
1957	3,935	78.3	660	1.3	5,024
1958	6,798	79.2	1,103	12.9	8,585
1959	5,288	59.5	1,945	21.9	8,890
1960	3,007	39.0	3,255	42.9	7,714
1961	2,978	37.9	3,934	50.4	7,683
	Imports in institutional pack[c]				
1955	1,161	100.0			1,161
1956	2,794	80.8	665	19.2	3,459
1957	1,800	73.2	660	26.8	2,460
1958	3,353	75.2	1,103	24.8	4,456
1959	2,254	53.7	1,945	46.3	4,199
1960	1,758	35.1	3,255	64.9	5,013
1961	1,184	23.4	3,876	76.6	5,060

a/ Includes amounts from other countries.

b/ Blanks indicate import data not available.

c/ One pound or more; 30-pound barrel is most common size.

Sources: Canada Bureau of Statistics, Trade of Canada: Articles Imported from Each Country (Ottawa, quarterly cumulative).

Idem, Imports by Commodity (Ottawa, monthly cumulative).

of production and transportation factors plus quality characteristics and market demand can probably be suggested as the explanation.[1/]

The fact that Mexican frozen strawberries are all industrial-institutional pack, however, further pinpoints the competition with which United States producers are faced. While total Canadian imports of frozen strawberries were holding relatively stable, as we have noted, those in institutional pack were increasing to some extent, which could have been inferred from our previous notation of the increasing proportion being supplied from Mexican producers. The most striking decrease, therefore, has been shown by United States exports to Canada of frozen strawberries in institutional-industrial size. Whereas United States producers supplied over 75 percent of the total imports into Canada in that category in 1958, they supplied less than 25 percent in 1961. United States exports of frozen strawberries in packs weighing 1 pound and more ran over 3 million pounds in 1958 and less than 1.5 million pounds in 1961. In the latter year, Mexico supplied over 75 percent of Canadian imported institutional-pack frozen strawberries--an actual amount of nearly 4 million pounds.

While noting the competitive position of Mexico in the Canadian market, however, it is well to retain our perspective. Even in the peak year of United States frozen strawberry exports to Canada, 1958, when over three-fourths of Canadian imported frozen strawberries came from the United States, the total United States exports-to-Canada figure represented only 2.5 percent of the total United States frozen strawberry pack. Further, those frozen strawberries packed in institutional-industrial size were less than half of the total exports. Nonetheless, for United States processors in certain areas or in specialized pack, the concentration competition from Mexican producers may be severe.

Institutional Pack Trends in California

As far as California is concerned, a larger percentage of the state's decreasing frozen strawberry pack has been going into institutional channels.

1/ It should be added that an export duty and/or license fee must be paid by the Mexican strawberry industry to the Mexican authorities to export, as well as import duties to the country of destination. However, rebates to the industry are also made, the amount depending on the condition of the industry and the relationship of industry to the economy and to government at any particular time.

It is of interest that, since 1956 when data began to be emphasized by reference to the division of the state's frozen strawberry pack into retail and institutional size, the decline in proportion of frozen-pack going into retail sizes had been steady, even precipitous as shown in the following tabulation:

Year	Percent in retail size
1956	56.2
1957	52.4
1958	47.7
1959	34.7
1960	32.0
1961	30.7
1962	33.5

In 1962, however, 33.5 percent of the California pack went into retail sizes, marking an increase over the previous year for the first time since 1956. Even so, institutional pack remains the major outlet for the past four years. Nationally, the retail-institutional division of the annual frozen-pack has been less one-sided. Since 1959, however, it is reported that more than half the national frozen strawberry pack has gone into institutional-size containers. The importance of this trend back to large institutional use of the frozen strawberry total pack is under considerable current discussion in the industry.1/

Any strong impact from Mexican competition at the present time, therefore, would be felt to a somewhat greater degree by the institutional packer whose product now constitutes a larger segment of the frozen, and thus the processing, strawberry industry. Despite shifting utilization in California, it would be assumed to be a larger factor in the Northwest industry. It might also be felt more strongly in California if the export market to Canada in reality took a very noticeable proportion of the total frozen strawberry production of the California processors. Again, this might well be more relevant to Northwest producers. At the moment, it can only be suggested that the influence of Mexico specifically as a competitor for California in the frozen strawberry industry seems, from currently available data, scarcely comparable in importance to the relationship between the Pacific Northwest and California.

1/ See, in particular, Quick Frozen Foods, Vol. XXIV, No. 4 (November, 1961), p. 138, and following various monthly issues.

V. Producing and Marketing Strawberries in California

After giving a general description of the strawberry industry and the changes which took place with the introduction of quick-freezing, we have considered in some detail the production trends in fresh and frozen strawberries since World War II. Our major attention has been devoted to trends in California and California's competitive position in the growing of this specialty crop. Before turning to the analysis of prices paid to California growers, we should outline briefly some of the special characteristics which govern the growing and selling of strawberries in California.

The large-scale growing of strawberries is no longer a unique feature of California's strawberry production, although typical acreage per grower still varies, nationwide, from 2 acres in Florida to 20 in Virginia and California.[1/] Nor can the cultural practices used in California be said to be unusual now that comparable techniques for spraying, irrigation, fertilization, preparation of transplants, and harvesting practices are more or less generally accepted in the areas of major strawberry production.

Nevertheless, the practices of growers in the largest producing area in California and the nation, the Salinas Valley, are specifically designed to promote and exploit the relationship between the very high yield and carefully developed growing techniques. That they have been successful has already been shown. One large grower in that area has described current operations in some detail.[2/] These include the preparation and planting of 400-500 acres each year, which is leased from local owners and returned generally after four years' use. Transplants are brought almost entirely from a single area in northern California and are planted from December through mid-January. This company plans to pick about 2,000 acres per year and harvests from April through October, employing as many as 3,000 workers at the height of the season.

The double-row beds, irrigated by sprinkler on new plants and furrow in more mature areas, are picked every three days for fresh market utilization

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1/ Dennis and Sammet, "Interregional Competition in the Frozen Strawberry Industry," Hilgardia, Vol. XXXI, No. 15 (December, 1961), Table 7, p. 529.

2/ Western Fruit Grower, Vol. XVI, No. 1 (January, 1962), pp. 17 ff.

and every five if processed and frozen. This grower has both processing plant and freezer and divides the crop about 50-50 between fresh and frozen channels.

A recent University of California Agricultural Extension Service publication, which covers the growing of strawberries in southern California, indicates that polyethylene bed mulches and soil fumigation are in general use but that annual planting has replaced long-term planting in this section of the state.[1] Although the principal strawberry varieties grown in southern California are not identical with those of north central California, the transplants are brought from the same nursery areas near Red Bluff and Redding, a northerly moderate altitude area free from strawberry diseases.[2]

Costs of Production in California

Although nearly all sources are inclined to note that California costs of production in strawberries are high, this assumption is often based on a general proposition that all California farm costs are high and perhaps higher than elsewhere. In general, cost of land and labor; materials costs for spray, fertilizer, irrigation, etc.; and rental and repair costs for equipment for large-scale production of strawberries would indeed support the conclusion that strawberries are expensive to grow in California.

Although, ideally, a full discussion of these costs might precede a discussion of strawberry prices, we shall note at this point only that other experts have tentatively concluded that strawberry production costs per pound give California a slight unit cost advantage, in large part because of high-yield, long-season production.[3] These findings, however, conclude that Oregon and Washington

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1/ Albert H. Holland, Hunter Johnson, Jr., and Bernarr J. Hall, Strawberry Production in Southern California, California Agricultural Extension Service Publication AXT-50 (Berkeley, 1962), 10p.

2/ Of the various new University of California strawberry varieties introduced in very recent years, the Solana is now being planted extensively in southern California, with evidence of some use in the north central acreage as well.

3/ Dennis, The Location and Cost of Strawberry Production, University of California, Giannini Foundation Mimeographed Report No. 217 (Berkeley, 1959), 25p. For further discussion, see, also, Dennis and Sammet, "Interregional Competition in the Frozen Strawberry Industry," pp. 53 ff.

are also similarly favored, so that it is a regional rather than single-state competitive advantage, which is also relevant, in the main, to frozen strawberry utilization. From this point of view, Florida and Louisiana were the only states eliminated on the basis of production costs alone, and the study notes that these two states are, in large part, fresh market areas.[1/]

The figures on which these findings are based, however, are necessarily tentative, using a small sample (not random) and are dependent on estimates, so they are not intended to be used as quotations of average realized costs but only as indicative of relationships. The Stanislaus area, quoted as of 1957-1959 as a higher cost area than that of Monterey-Santa Cruz, is indeed losing acreage in the 1960's. Sample costs per acre in southern California seem to be definitely higher than in the Salinas Valley but not substantially higher than those suggested in 1958.[2/] Acreage, as we have noted, is indeed increasing in the southern part of the state.

Although the question of adequate sampling and accurate estimates will always be part of any data gathering, two further assumptions built into the cost-of-production figures cited in available sources complicate their relevance to the study we are presently undertaking.

The sample costs that have been gathered have been based on an assumption that the acreage and crop in California are equally divided between fresh and processing utilization. While this was an applicable division of total utilization in the 1950's, it seems steadily less true in the 1960's, as shown by the production data in Part III. (It is, of course, not relevant to the acreage in southern California, nor were any cost estimates for the southern section used in the Dennis-Sammet study.) Since we advance as one hypothesis in our discussion of prices that the fresh and frozen prices are interdependent in some senses but that they are also subject to different determinants in other respects, the arbitrary division of utilization built into the cost estimates

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1/ But see cost-of-production estimates for New York cited in R. E. Linton and B. A. Dominick, Jr., Costs and Returns in the Production of Strawberries: Long Island and Western New York, 1961, Cornell University Agricultural Experiment Station A. E. Res. 84 (Ithaca, New York, 1962), 16p.

2/ Holland, Johnson, and Hall, op. cit., p. 10.

is a further disadvantage. In addition, since it is known that berries harvested for fresh market must be more carefully handled, labor costs and supervision would of necessity be higher, while strawberries for processing can be picked more rapidly without hulls and stems.

It is true that maturity, quality, location, and seasonal factors may make any given acreage more suitable for one outlet than another. Price changes, as we suggest, may also shift utilization throughout the harvest season. On the other hand, it must be remembered that acreage being picked for freezing cannot automatically be switched back to fresh market utilization, so anticipations of future market developments become important, and costs are often governed by such decisions.

The second complication with cost data is the incidence of processor-owned acreage, sometimes estimated as high as one-half of all acreage in central California sending strawberries to freezing. The integration of the operation of the entire process, from land preparation to brokerage, may tend to make the estimates attributed to growing even more difficult to determine than otherwise. This is also a problem when quoting relevant price-to-grower figures. For acreage which is not actually owned or leased by the processor but where the processor offers assistance to growers, such as loans and provisions of spraying, fertilizing, containers, etc., the same complication of assessing cost of production exists.

We can only conclude by suggesting that the preliminary study of costs of production for strawberries in California does not as yet alter a "horseback" generalization usually quoted in the trade. It is said that it costs about 10 cents a pound to grow and harvest berries for freezing and 12-14 cents per pound for fresh berries, basket included.1/

Freezing Strawberries in California

The development of the frozen strawberry industry in California and its emergence as the major growth segment of the strawberry industry in the postwar period lead logically to a need for more information covering the structure of this processing industry--locational factors, capacity for processing and storage,

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1/ Dennis' estimate (1958) was 9.6 cents per pound for berries for freezing.

limits of expansion of facilities, capital outlays, and other financial considerations. Here again we cannot explore these matters in this report but can only note certain aspects of the frozen strawberry processing industry suggested by others who have investigated this matter more thoroughly than we are able to do here.1/

Freezing and Storage Capacity for Strawberries on the Pacific Coast

Freezing plants and facilities in the Pacific Coast states have been surveyed by Robert H. Reed, and his report indicates the extent of the rapid expansion of processing and freezing facilities to match the spectacular growth in volume of frozen fruits and vegetables in specialized Pacific Coast producing areas, notably including strawberries.2/ On pages 6 and 7, he states:

> "In California, the total number of all types of freezer plants has risen from about 95 in 1945 to about 170 in 1955.1/ Substantial though less pronounced growth occurred in Washington and Oregon. The 1945 total of 50 plants in each state had grown by 1955 to over 60 in Oregon and 90 in Washington."
>
> . . . . . .
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> ". . . the greatest concentration of plants in Washington is in the northwestern section of the state along the Puget Sound and in the Yakima Valley. Oregon has two principal areas of concentration--the Willamette Valley of western Oregon and the Pendleton area of northeastern Oregon. There are three important concentrations of

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1/ For a discussion of industrial considerations--cost, location, etc.--in the freezing of strawberries on the Pacific Coast, see:

Dennis, An Analysis of Costs of Processing Strawberries for Freezing, University of California, Giannini Foundation Mimeographed Report No. 210 (Berkeley, 1958), 77p.

Dennis, The Location and Cost of Strawberry Production.

Dennis and Sammet, Regional Location of Production and Distribution of Frozen Strawberries.

Dennis and Sammet, "Interregional Competition in the Frozen Strawberry Industry." (A revision of the above report by Dennis and Sammet.)

2/ Robert H. Reed, Survey of the Pacific Coast Frozen Fruit and Vegetable Processing Industry, University of California, Giannini Foundation Mimeographed Report No. 198 (Berkeley, 1957), 36p.

freezer plants in California. The largest is in the Santa Clara, Pajaro, and Salinas valleys which lie immediately below the San Francisco Peninsula in the central coastal area. Next in importance is the area bounded on the north by Yuba City and on the south by Sanger in the Central Valley. The south coastal area from San Luis Obispo to Los Angeles is also important."

"1/ The relatively rapid rate of growth in California is partly attributable to a large increase in the number of plants packing prepared food items and specialties."

Reed's survey shows that, while many of the fruit and vegetable plants freeze more than one product, the specialized one-product plants in Washington and California freeze mostly berries. In Oregon, green peas are a specialization as well as berries. In addition, on pages 7 and 9, he states:

"About 70 percent of the Pacific Coast processors perform only the receiving, preparation, and packaging operations and depend upon commercial cold-storage companies to perform the freezing and storage operations. These plants have the freezing and initial storage done at a regular service charge. The remaining plants own all or part of their freezing and storage facilities. Net capacity of refrigerated warehouses, which are capable of holding temperatures at 0° Fahrenheit or lower, has increased 47 million cubic feet in the Pacific Coast area since 1945. According to interview information from a number of plant managers, there is still some shortage of cold storage in a few processing areas. This necessitates some movement of product during periods of peak production."

In a compilation of average annual growth rates in the freezing of selected fruits and vegetables in the Pacific Coast states from 1945 to 1955, Reed shows that in freezing strawberries, the California average rate of growth per year has been 28 percent, while it has been averaging 10 percent in the comparable decade in the Northwest. His report also emphasizes the major importance of the strawberry segment of the freezing industry in California. From a sample of freezing plants processing major commodities in California, Washington, and Oregon, Reed concludes that the average number of days operated by a plant processing strawberries in his sample in 1955 was 120 days in California--considerably longer than for any other frozen processed crop in the state. The average number of hours operated per plant (in his sample) during this period was, he found, 995 hours--again, a larger number than used in freezing any other crop. In Washington and Oregon, again in 1955, about one-third the number of days was devoted to freezing strawberries, on the average, than in California, with peas and green beans in Oregon and corn and asparagus in Washington taking as much if not more of freezing plant operating time.

Although current figures are not available updating Reed's report, there is at present no reason to suppose that there has been any basic change in the organization of freezing facilities on the West Coast. Certainly, a smaller segment of the total strawberry production has been frozen in California since 1958, and the actual poundage delivered to freezers has decreased by over 25 percent since the Reed study was published. A detailed survey of freezer facilities currently in operation might well indicate some additional diversification of crops handled by previous all-berry freezers, but more than likely it would show some decrease in the total number of freezing plants. Although frozen strawberry production showed its first uptrend since 1958 in the 1961 season, there may still be attrition in the ranks of strawberry freezers who find the fluctuating economic conditions too rugged for profitable operation.

Marketing Orders for Strawberries

With the growing importance of strawberries as a valuable crop in California and one in which both processed and fresh product move out of the state in competition with other areas, it is not surprising that increasing attention has been given to the marketing and advertising of the California product.

On July 7, 1955, a marketing order for strawberries became effective in the state of California. This order was established under the authority of the California Marketing Act and applies to all strawberries processed in California and all strawberries packed in California for fresh shipment outside the state. All strawberries marketed in fresh form for consumption within the state are excluded from the provisions of the order. The organization and establishment of the Strawberry Advisory Board and other administrative rules and regulations are similar to other such marketing orders in California, with assessments levied on growers, processors, and shippers according to volume of berries handled, which are regulated by the order. The suggested objectives of the order are:

1. The promotion of the sale of California strawberries.
2. The investigation and report of economic and marketing conditions affecting strawberries.
3. The initiation of necessary marketing and/or processing and production research and survey studies relating to strawberries.

The order specifically prohibits quantitative regulations or restrictions on deliveries, processing, or shipping of strawberries. There are stipulated

procedures for amendment or termination of the marketing order if conditions warrant changes.

The assessments levied to finance the operation of the order have been made at the maximum rate allowed by the legislation in every category except one since its inception. In 1958, therefore, the assessments were: (1) 1/2 cent per crate, or the equivalent, on producers for strawberries shipped; (2) 1/4 cent per crate, or the equivalent, on shippers for strawberries shipped; (3) 1/2 cent per 14 pounds on producers for berries delivered to and received by processors for processing; and (4) 1/2 cent per 14 pounds on processors for berries received and processed.[1/] The maximum for category (2) that could be levied on shippers was also 1/2 cent, and by 1960 the assessment on fresh strawberry shippers had been raised to the legal maximum for that category.

Any increases, therefore, in the assessment rate would have to be voted by the State Legislature as an amendment to the original legislation before they could be ordered by the State Director of Agriculture upon the direction of the Strawberry Advisory Board, since the maximum assessment is being levied in every category. So far, this has not been the tactic employed; rather, another order has been added, which will be discussed below.

The representation of the strawberry industry for the Advisory Board as originally constituted included 18 members--8 producers, 5 processors, and 5 shippers (and alternates for each category). The producers were to be appointed as representatives of eight districts in California; the processors and shippers are representatives-at-large. The producing districts were originally delineated as follows:

District	
1	San Diego and Imperial
2	Los Angeles, Orange, Riverside, and San Bernardino
3	Ventura, Santa Barbara, and San Luis Obispo
4	Madera, Fresno, Kings, Tulare, Kern, and Inyo
5	Monterey
6	Santa Cruz, San Mateo, and San Francisco
7	Alameda, Santa Clara, and San Benito
8	Merced, Stanislaus, Sacramento, and miscellaneous producing areas not included in Districts 1-7

1/ California Department of Agriculture, Bureau of Markets, Marketing Order for California Strawberries, Effective July 7, 1955 (Sacramento, 1955), 16p., and subsequent annual orders of the Director of Agriculture establishing rates of assessment pursuant thereto.

By 1959, these districts were redelineated by an amendment to the order, possibly indicating the realignment and division between fresh and processed representation of acreage and production and undoubtedly showing the shifting production totals since the original order. The number of districts was reduced to seven. District 1, formerly San Diego and Imperial Counties, was enlarged to include all the "southern" area where, as we have already noted, the major production is for fresh market channels. Therefore, Districts 1 and 2 were actually combined into the new District 1--San Diego, Imperial, Los Angeles, Orange, Riverside, and San Bernardino. The other districts were renumbered, leaving a total of only seven districts; but the county of Monterey--formerly District 5, now District 4--was given two members. This, of course, indirectly indicates its superior position as a strawberry-growing area. The modification of districts was authorized in the original order which provided (Article II, Section A, No. 5) that changes in localities or areas of strawberry acreage or quantities produced could be translated, for equitable and proper representation for all areas, into redistricting or otherwise rearranging representation on the Advisory Board.

Marketing Order for Processing Strawberries

The marketing order for strawberries, fresh and processed, which we have outlined above is still in effect at the present time. However, a new marketing order for processing strawberries became effective on July 7, 1960. This order is an additional directive covering berries for processing only. It authorizes and requires grading and inspection of all strawberries utilized for processing.[1/]

The 1960 order outlined two grades for strawberries which would go to processors and provided for a grading committee as well as a processing advisory board.[2/] The seven members of this committee, each of whom must be a producer of strawberries utilized for processing into strawberry products, are appointed by the Director of Agriculture on the recommendation of the Advisory Board or the industry generally. The committee is authorized to recommend grade standard

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1/ California Department of Agriculture, Bureau of Markets, Marketing Order for Processing Strawberries, Effective July 7, 1960 (Sacramento, 1960), 18p.

2/ A processor is defined as a person treating strawberries by heat or freezing.

changes which will then be transmitted through the Advisory Board to the California Director of Agriculture for enactment. Processors are required to limit the use of strawberries for processing to those berries meeting the grade standards.

Inspection and certification of the grade standard are done by an authorized agency (actually a federal-state cooperative inspection team), and the costs of such inspection are borne by the processor who receives the strawberries and wishes to utilize them. The maximum assessment rate set to defray expenditures and finance this new processing strawberry order is 1 cent per crate of 14 pounds or its equivalent, to be paid by the processor. This rate is charged for all strawberries received by the processor and utilized for processing into strawberry products.

The representation provided in this marketing order is similar to that provided for the producers in the 1955 order. However, one member of the Advisory Board is to represent the preservers. It is to be assumed that the other members would, in general, represent freezers.

In June of 1961--one year after the processing strawberry order was originally passed--a major amendment to the act was made adding a prohibition of certain unfair trade practices, mostly dealing with reporting of prices paid for strawberries for processing. Three specific practices were listed, all dealing with misrepresentation of prices, and the authorization of price posting and filing provisions was included in the amendment to deal with these alleged abuses. It was stipulated that, at the request of the Advisory Board, the State Director of Agriculture could require all processors to post and file with the Processing Strawberry Advisory Board a schedule or schedules of their prices and price terms. Revisions may thereafter be posted and filed or withdrawn as the given processor finds it necessary. Administrative regulations were then issued under the legislation which allowed "conforming price changes" under special conditions which would tend to make all processors' prices identical within 24 hours. Cooperatives were allowed certain membership based exceptions to the price posting requirements, also by administrative regulation, as were specifically integrated producer-processor organizations.

These regulations and the major amendment to the processing strawberry order which initiated them became effective June 1, 1961, and presumably governed the remaining 1961 processing season. Since the termination date had been specified as December 31, 1961, a new marketing order for processed strawberries was

initiated and circulated for agreement for 1962. After the necessary assent of processors was obtained, the new order (actually a renewal of the June, 1961, order) was promulgated as of January 1, 1962. The only difference between the 1962 order and that of 1961 (which was the original 1960 order plus the amendment of 1961) was the omission of any terminal date. The present order, therefore, will continue in effect until terminated by the provisions outlined in the order itself (Article XI, Section B).

The processed strawberry marketing order might well be assumed to have as one major aim an attempt by the majority of processors to improve the quality of California processing strawberries by setting grades for the product which would eliminate the low-grade product and thus lower quantity while raising quality.

A California Department of Agriculture Marketing Survey Report made at the request of the California strawberry industry and published in 1959 suggested, among other recommendations, that minimum grade requirements might be established by the industry by means of the promulgation of a special marketing order.[1/] The 1960 order, therefore, may well be the response to this suggestion. The Ellsworth report offered the minimum grade requirement as one solution to the lack of uniform quality of California strawberries, which he concluded was a repeated complaint of retailers and distributors about the California-grown product.[2/]

In addition, it can also be argued that such a marketing order would tend to add marketing stability and possibly an indirect control or limitation of the supply of the produce--at least that of poor quality.[3/] The amendment to the processed strawberry marketing order of 1961, however, concerning posting and filing price schedules, was not necessarily suggested or recommended, although it may have been contemplated, by the Ellsworth report. It is certainly possible that the prices and price schedules published or filed under the regulations of

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1/ California Department of Agriculture, Improving the Marketing of Fresh and Frozen California Strawberries, Marketing Survey Report No. 16 (Sacramento, 1959), 22p. This survey was conducted by H. M. Ellsworth, Marketing Economist, Bureau of Markets, California Department of Agriculture, for the California strawberry industry. The project was financed by federal and state funds.

2/ Ibid., p. 11.

3/ Ibid.

this order as now stipulated may lead to identical posted prices for all buyers within a very few hours of any change that might be made and similar terms for purchase.

No Comparable Marketing Orders in Other Strawberry-Producing Areas

Louisiana is the only other area of production with a state marketing order covering strawberries. Its current order has been in effect for two years, although there were important administrative changes made between 1961 and 1962.[1] Since Louisiana's crop is, in the main, fresh strawberries, the order was designed with this in mind. In large part its purpose is promotion and its procedures concentrate on the appointment of a "one desk" sales agency. Although purposes and procedures differed between the states, the California Strawberry Advisory Board and its manager were called upon for advice and assistance when the Louisiana order was contemplated and first put into operation. It is as yet too early to draw any conclusions or comparisons based on its very brief history.

An Expanded Market for Fresh and Frozen Strawberries

One major purpose of the 1955 marketing order for strawberries in California, which has continued to the present time, is the advertising and promotion of fresh strawberries shipped out of state and all processed (frozen) strawberries. By 1961, the strawberry promotion order affected 982 producers and 45 handlers or processors who marketed almost the entire crop of commercial value in the state.[2] The estimated farm value of strawberry production in 1961 was over $36 million and the strawberry industry ranked eighteenth among California's agricultural products. Promotion expenditures administered for the industry by the Strawberry Advisory Board have averaged around $48 thousand per year for the last few years.[3]

1/ E. P. Roy, J. M. Law, and W. H. Alexander, A State Marketing Order for Louisiana Strawberries, Louisiana Agricultural Experiment Station D.A.E. Circular 307 (Baton Rouge, 1962), 79p.

2/ California Department of Agriculture, Bulletin: Forty-Second Annual Report, Vol. LI, No. 2 (Sacramento, 1962), p. 45.

3/ Jerry Foytik, Agricultural Marketing Orders: Characteristics and Use in California, 1933-1962, University of California, Giannini Foundation Research Report No. 259 (Berkeley, 1962), p. 90.

Recently, the public relations efforts have concentrated on the institutional use of frozen berries. Here, the Advisory Board has had the cooperation of the American Dairy Association on "selling" the ice cream industry. Although California strawberry interests have expressed a desire for promotion of frozen strawberries on a nationwide basis, with the combined efforts of the producing areas of the South, Midwest, and Northwest, it has not been possible to get full support for a general program in past years.

Cooperation with other strawberry interests throughout the country was obtained, however, in the efforts made in the past few years to limit imports of Mexican strawberries. Considerable time and money have been spent on developing a technique whereby, either by legislation or persuasion, Mexican competition can be controlled.1/

Despite efforts to increase the demand for fresh and frozen strawberries, per capita consumption seems never to have equalled the prewar levels when fresh strawberries were the major source. As we have seen, fresh strawberry consumption seems not to have been able to retain the gains of the 1956-1959 period which were roughly comparable to the immediate postwar totals of a decade earlier. Frozen strawberry consumption, now declining for the first time in frozen strawberry history, seems to have returned to roughly the level of the early 1950's. Expanding population in the United States in general, and on the Pacific Coast in particular, created a growing market for strawberries, as for all foods. But the constantly increasing demand that was consequently hoped for seems not to have been able to keep pace.

Regional increases in population, and California increases in particular, are of special relevance to strawberry growers who must move a specialty, perishable crop within a short space of time under special transportation conditions, preferably not too far. For this reason, as for many others, including a more favorable price situation, we have noted that the fresh market for strawberries is again the major outlet for growers in California.

We have also seen that the frozen strawberry industry developed a growing market for its product during the postwar period with its consistent improvement of techniques and expansion of facilities to handle its product, including the

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1/ Malcolm B. Douglas, "Frozen Strawberries Today," Quick Frozen Foods, Vol. XXIV, No. 10 (May, 1962), pp. 44 ff.

important added investment required of the buyers--a household refrigerator or freezer to hold the frozen product. But we have also seen that the consumption of frozen strawberries has not continued to increase into the second postwar decade.

Therefore, in line with the seeming failure of the proportional increase of demand with expansion of population, there have been certain moderately successful efforts made to decrease the supply. These have paralleled the industry efforts to promote increased demand during the past few years. It is to these and other influences on price that we now turn.

VI. Demand Behavioral Relations of Grower Prices

Introduction

The changing nature of the strawberry industry has been reflected in its various segments--field production, fresh shipping, processing, regional and national distribution, and pricing at the critical points in the supply-demand system from grower to final consumer. In this section, particular attention is given to the behavior of grower prices. Although grower prices reflect only one dimension of the price structure, they certainly are a significant dimension and in that sense merit attention. Also relevant is the fact that generally more adequate grower prices are available for analyses than are other prices such as those at the retail, wholesale, packer, or fresh-shipping levels of distribution. But even the grower prices are not fully satisfactory in terms of adequacy and accuracy. The prices reflecting fresh shipping and processing, respectively, are not precisely comparable, and the latter are influenced by the significant proportion involved in growing-processing cooperatives or in special contract arrangements between growers and packers. Yet, grower prices are deemed sufficiently adequate for economic-statistical analyses to clarify the basic and underlying influences on price formation.

Limiting attention to grower prices of the overall strawberry price structure, this section of the report presents results of several analyses. The first is concerned with relations between California and the Northwest; and, in both regions, strawberries at large--rather than distinguishing between fresh and processed--are considered. The second analysis also pertains to California and the Northwest, but the influences of other regions in the country and imports of frozen berries are included, with recognition given to the differential impacts of the fresh shipping and processed utilizations. The third analysis reflects disaggregation of fresh and processed strawberries in California, the Northwest, and other producing regions and includes United States imports and also cold storage holdings. The difference between the second and third analyses is in part that of variables included but more that of the form of the equations underlying the analysis. The differences will be noted later, but, first, some comments on price aspects are presented and then demand variables and market influences are considered.

Prices and Related Aspects

The only well-established price series based on official sources for strawberries gives "season average price to growers" on an annual basis. This series is available for strawberries for all uses and separately for fresh and processed utilization (see Appendix Tables VI through XI). There are no other price data which can be considered adequate for analytical use. Even the season average price to growers contains more than one inherent difficulty when used (1) as a representation of "real" prices prevailing in the industry as a whole and (2) for the purpose of comparing fresh and processed prices over the past 15 years.

The two major difficulties in using the available price series quoting price paid to growers are: (1) representativeness and validity and (2) lack of actual comparability. The difficulty with representation and validity of quoted price to growers arises from the large amount of the annual strawberry harvest which can be assumed from experience to change hands at other than reported prices. There are indications that over half of the tonnage processed in California is actually processor owned.1/ If this is the case, there is some validity to the assumption that the quoted growers' price for over half of the processed strawberry crop in California is or could be a "bookkeeping entry" figure.

Many factors other than price enter into the marketing of berries for processing, including special loans, allowances for plant variety development, cultural practices, transportation, packing, condition of the fruit, concessions on costs of facilities for cooling and storing, etc., which are made by the processor to the grower. Similar nonprice considerations also exist in the fresh market channels.

Lack of comparability between fresh and processed reported prices must be recognized. While "price for processing" reports the price of "naked fruit" paid to growers as listed by the California Crop and Livestock Reporting Service, the price for fresh strawberries includes at least the container.2/ When comparing fresh and processed price per pound for strawberries, therefore, either in parallel series or in generalizing about shifts in utilization, these

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1/ Reed, op. cit., indicates that, in 1955 in his sample of 31 freezing plants in California, 56 percent of strawberries for processing were actually processor owned, 37 percent were obtained from contracted acreage, and only 7 percent were purchased in the open market.

2/ See page 14.

differences might be recognized and remembered. However, the figures that are available have always been quoted in this fashion so the series are at least consistent and may certainly be used, noting the information just given, to indicate trends.

Wholesale and retail prices for strawberries in the United States, both fresh and processed, are quoted from time to time in various official sources[1] as well as in several trade journals.[2] These are often quoted on both a nationwide and West Coast basis. However, the data are so scattered and the comparability so indeterminate that they cannot be used effectively in a meaningful fashion.

With the shift to processing since World War II, the strawberry crop utilization is not only important in and of itself but is an important price determinant as well. In California the price differential per pound for strawberries going to fresh and processed markets has varied in the postwar period from equality in 1950 to a quoted processed price that is only slightly more than half the quoted fresh price to growers in 1962. Whether this, in turn, actually meant greater returns to the grower who sent his product to the fresh market is not statistically known. Costs of marketing fresh must of necessity be higher but how much higher cannot be ascertained from available data. The price data, both for fresh and processed strawberries, with which we deal must be considered as a rough estimate giving some indication of, but certainly not exact, value received by growers.

In Part IV we gave brief examples of the differing harvesting techniques employed in the two utilizations in California. We know that offered price alone can scarcely determine the utilization of the product from week to week during the season. Institutional patterns for marketing strawberries are important in determining the channels for selling any grower's product. He may market through a cooperative, sell to a broker, and contract to a processor; but, on the whole, as an individual he may not be able to change in midstream no matter what the price pattern. We also know, however, that the production

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1/ See the U. S. Bureau of Labor Statistics publications Wholesale Price Index and Retail Price Index and several U. S. Department of Agriculture publications covering farm prices and farm income.

2/ For example, Quick Frozen Foods and Canner/Packer (Western Edition).

of strawberries has become less a matter of many individual growers' decisions and more a matter of planned production by large-scale concentrated farm-firms.

But with these facts in mind--and although use for fresh and frozen purposes cannot be considered completely interchangeable--it is true that a choice is possible in California. It is, therefore, particularly relevant to investigate the association of the fresh-frozen price relationship. It is no longer true that the only decision that can be changed, once the season is under way, is whether to sell the fruit at all. This is summarized by an article covering the central California industry:

> "As the fresh market price moves downward from its early season high, tonnage begins to switch to the freezers. Although price is a major factor, it is by no means the only one. Berries for freezing can be picked less selectively, and dockage is less. Maturity and quality of an individual field may make it more desirable or suitable for one market or the other. A field that is being picked for freezing can't be switched back to fresh market quickly, so future developments of the market become important in the decision. Most major shipping organizations either own a freezing operation or have a close working relation with one, and in practice the division of supplies between the two outlets is often in the hands of the managers of the shipping and freezing operations." 1/

Although there is not a complete two-way interchange between uses at the producer level and although institutional factors play an important but indeterminate role, there is an important interdependence of price to be tested. Also, there is need for investigating the extent to which the annual frozen-pack and carry-over in the United States, California, and the Pacific Coast is a price-determining factor for frozen strawberries. Table 24 shows the United States and Pacific Coast frozen-pack figures and the carry-over, nationwide and regionally, into each new season.

In noting the important factors which affect the price of strawberries in California, both fresh and processed, our survey in Part IV has already laid the foundation for the view that, despite its prominent position in the industry, California cannot produce and price its strawberries "in a vacuum." Competing and supplementary sources of the products must be anticipated and accounted for. This is particularly true now that processing and fresh market channels divide the industry.

1/ Richard Conley, "What's Happening to Strawberries in Central California," Produce Marketing, Vol. I, No. 5 (May, 1958), p. 20.

TABLE 24

Frozen Strawberry Summary: Pacific Coast and United States
End-of-Season Cold Storage Holdings and Frozen-Pack
1947-1961a/

Year	Pacific Coast		United States	
	End-of-season cold storage holdings b/	Frozen-pack c/	End-of-season cold storage holdings b/	Frozen-pack c/
	thousand pounds			
1947	2,608	62,927	17,675	109,036
1948	2,745	102,659	15,908	160,077
1949	7,731	78,091	36,370	107,603
1950	1,442	109,178	11,077	193,771
1951	10,231	92,227	49,859	157,942
1952	8,019	152,770	41,494	206,635
1953	11,335	193,742	45,428	227,605
1954	10,941	196,083	51,543	227,135
1955	6,511	239,717	40,633	276,180
1956	18,078	255,150	64,995	312,293
1957	32,765	231,092	102,346	260,864
1958	30,679	228,932	84,201	269,647
1959	39,271	210,710	88,659	248,253
1960	42,649	195,181	84,648	231,759
1961	31,306	188,955	89,486	218,320

a/ Data used for analysis in Part VI are based on figures through 1961. They do not contain figures for 1962 nor the latest revisions. Differences are not great enough to change results of the current analysis.

b/ End of April is considered end of season.

c/ Calendar year.

We have laid the groundwork in earlier sections for the emphasis on the relationships between California and the Northwest. To delineate the regional character of the total strawberry supply and its influence on price, we have compiled several strawberry tables to illustrate this further. Table 25 shows California and Northwest total strawberry production for 1947-1961. Table 26 carries the summary further to show United States total production, Pacific Coast production, and all other states combined. In the same table, we have made the same combinations for processed and fresh market use. These data, in conjunction with others, are useful in investigating the price relationships between California and the Northwest, where processing is the major outlet for strawberries. One current view is that "lack of correlation" of strawberry processed price to quantity is the influence of fresh strawberry price on processing strawberry price (at the farm level).[1/] The California-Northwest relationship is particularly relevant in investigating this matter.

In our investigation, a certain price series has been constructed to yield an estimate of season average price to growers for California, the Northwest, and the Pacific Coast (Table 27). This is based on the reported prices we have described and is a weighted average price for both the area it covers and fresh and processed use combined. We have further derived a price series of the same type broken down into the fresh and processed use (Table 28). Here again it is a weighted average price by area. These specially constructed price series are used in analyses we discuss below.

With less empirical basis but because of the new growth area for strawberries centered in northern Mexico, we add an investigation of the introduction of a proportionately small but rapidly increasing frozen strawberry supply imported into the United States from this area (Table 29). We are particularly handicapped by the lack of comparable data showing exports from the United States. Lacking this parallel check to determine whether strawberry exports have also been a growing factor in the movement of frozen strawberries, we indicate possible price effects of the further growth of imports as a special category of any possible increase in supply of the total quantity of frozen strawberries.

1/ See Dennis, "Strawberry Prices and Marketing Margins," p. 652.

TABLE 25

Strawberry Production Summary: California and Northwest
1947-1961

Year	California	Northwest
	thousand pounds	
1947[a]	37,284	51,864
1948[a]	51,348	86,158
1949	50,908	65,664
1950	81,282	66,452
1951	88,113	52,830
1952	114,912	89,346
1953	152,938	105,915
1954	159,467	102,733
1955	166,740	122,745
1956	243,200	80,353
1957	223,560	133,900
1958	210,800	109,140
1959	170,280	135,120
1960	156,780	118,350
1961	207,000	114,600

a/ Figures are estimated by the authors from data originally quoted in crates by the U. S. Department of Agriculture. Revised U. S. Department of Agriculture estimates are 35,966 for 1947 and 49,590 for 1948 for California; Northwest would be 53,664 for 1947 and 87,598 for 1948. See discussion on pages 15-16.

TABLE 26

Strawberry Production and Utilization Summary: United States, Pacific Coast, and All Other States
1947-1961

Calendar year	Total production			Utilization					
				Fresh			Processed		
	United States	Pacific Coast	All other states	United States	Pacific Coast	All other states	United States	Pacific Coast	All other states
	thousand pounds								
1947 a/	336,200	89,148	247,052	238,968	36,686	202,282	76,568	52,462	24,106
1948 a/	391,600	137,506	254,094	226,116	45,978	180,138	141,338	91,528	49,810
1949	311,900	116,572	195,328	218,757	50,408	168,349	92,127	66,164	25,963
1950	393,617	147,734	245,883	222,957	53,962	168,995	170,660	93,772	76,888
1951	405,414	140,943	264,471	258,288	60,465	197,823	144,246	80,478	63,768
1952	416,927	204,258	212,669	228,717	75,398	153,319	188,210	128,860	59,350
1953	427,631	258,853	168,778	214,676	79,877	134,799	212,955	178,976	33,979
1954	411,469	262,200	149,269	184,402	79,722	104,680	222,819	182,478	40,341
1955	446,716	289,485	157,231	187,423	71,851	115,572	259,293	217,634	41,659
1956	548,036	323,553	224,483	241,068	92,328	148,740	306,968	231,225	75,743
1957	550,638	357,460	193,178	276,297	127,860	148,437	267,858	229,600	38,258
1958	531,387	319,940	211,447	264,694	105,140	159,554	265,993	214,800	51,193
1959	477,674	305,400	172,274	236,273	103,500	132,773	240,901	201,900	39,001
1960	466,789	275,130	191,659	237,909	92,030	145,879	228,880	183,100	45,780
1961	512,623	321,600	191,023	290,049	140,420	149,629	222,574	181,180	41,394

a/ Figures are estimated by the authors from data originally quoted in crates by the U. S. Department of Agriculture.

TABLE 27

Strawberry Price Summary: California, Northwest, and Pacific Coast Season Average Price to Growers, All Uses, 1947-1961

Year	California	Northwest	Pacific Coast
	weighted average price in cents per pound		
1947[a]	23.62	18.83	20.83
1948[a]	20.99	20.11	20.44
1949	18.40	14.95	16.42
1950	20.00	22.90	21.30
1951	20.80	17.16	19.43
1952	18.40	15.59	17.15
1953	17.80	16.60	17.31
1954	19.00	15.46	17.59
1955	20.20	16.04	18.42
1956	16.90	15.60	16.61
1957	14.40	8.41	12.13
1958	15.60	12.50	14.54
1959	19.10	13.73	16.71
1960	20.10	14.49	17.69
1961	17.60	12.29	15.71

a/ Estimated on basis of production data converted from crates to pounds.

TABLE 28

Strawberry Utilization and Price Summary: California, Northwest, and Pacific Coast
1947-1961

Calendar year	Utilization						Season average price to growers					
	California		Northwest		Pacific Coast		California		Northwest		Pacific Coast	
	Fresh	Processed	Fresh	Processed	Fresh	Processed	Fresh	Processed	Fresh	Processed	Fresh	Processed
	thousand pounds						weighted average price in cents per pound					
1947[a]	30,314	6,970	6,372	45,492	36,686	52,462	23.9	22.4	23.77	18.13	23.88	20.83
1948[a]	40,434	10,914	5,544	80,614	45,978	91,528	21.7	18.2	22.49	19.95	21.63	20.44
1949	43,122	7,786	7,286	58,378	50,408	66,164	18.7	17.0	19.13	14.32	18.76	14.64
1950	47,724	33,558	6,238	60,214	53,962	93,772	20.0	20.0	25.75	22.61	20.66	21.68
1951	54,317	33,796	6,148	46,682	60,465	80,478	21.3	20.0	20.49	16.72	21.21	18.10
1952	68,162	46,750	7,236	82,110	75,398	128,860	20.0	16.0	19.28	15.26	19.93	15.53
1953	71,712	81,226	8,165	97,750	79,877	178,976	19.3	16.5	20.56	16.27	19.42	16.37
1954	71,577	87,890	8,145	94,588	79,722	182,478	22.6	16.0	20.10	15.06	22.34	15.52
1955	64,400	102,340	7,451	115,294	71,851	217,634	25.2	17.0	20.18	15.78	24.68	16.35
1956	88,500	154,700	3,828	76,525	92,328	231,225	22.1	14.0	18.80	15.40	21.96	14.47
1957	118,260	105,300	9,600	124,300	127,860	229,600	17.9	10.4	12.83	8.06	17.51	9.13
1958	97,800	113,000	7,340	101,800	105,140	214,800	20.1	11.7	19.52	12.00	20.05	15.30
1959	96,280	74,000	7,220	127,900	103,500	201,900	23.0	14.0	22.57	13.23	22.97	13.51
1960	85,780	71,000	6,250	112,100	92,030	183,100	24.1	15.3	19.63	14.21	23.97	14.63
1961	134,000	73,000	6,420	108,180	140,420	181,180	21.2	11.0	15.57	12.10	20.94	11.65

a/ Figures are estimated by the authors from data originally quoted in crates by the U. S. Department of Agriculture.

TABLE 29

Frozen Strawberries: United States Imports, 1947-1961[a/]

Year	Imports
	thousand pounds •
1947	0
1948	0
1949	1,172
1950	4,501
1951	6,346
1952	6,990
1953	8,057
1954	10,881
1955	12,011
1956	11,454
1957	13,754
1958	14,518
1959	14,414
1960	27,026
1961	31,793

a/ Data used for analysis in Part VI are based on figures through 1961. They do not contain figures for 1962 nor the latest revisions. Differences are not great enough to change results of the current analysis.

The importance of trying to determine the factors that influence price and to understand the various trends that can be observed in the economic marketplace, which has a strongly regional and usage bias in the case of strawberries, is the anticipation of various more or less predictable outcomes based on past experience as well as informed guesses. Our analyses pertain to California grower prices, concentrating on the years since World War II. We fully recognize that even this narrowed analytical goal is hazardous with the data constraints under which we must operate.

Demand Variables and Market Influences

In economic analysis, "demand" takes on a particular meaning which differs from the usual or conventional one of many businessmen in their practical affairs in the marketplace. There, demand is usually taken to mean the quantity or volume purchased. In economic analysis, however, demand refers to the net relation between price per unit and corresponding quantity per time period under certain specified conditions, including a given level of income and its distribution among potential purchasers, their given tastes and preferences, and fixed prices of other goods. When these "certain specified conditions" remain fixed, a decrease in price is related to or is associated with an increase in quantity (or an increase in price is associated with a decrease in quantity) in accordance with "the law of demand." But, if at least one of the certain specified conditions changes or takes on, or is given, a different value or level, economic analysis refers to the altered situation as a "change in demand."

An essential difference between the use of the term "demand" by the businessman in the marketplace and by the analyst in economic investigation is the degree of specification in explaining or accounting for changes in volume and/or in price. To the businessman, a change in volume or quantity taken by purchasers is alluded to as a change in demand; but, to the economic analyst, if the quantity change is associated only with a price change (all other conditions and influences remain fixed), demand is not considered to have changed even though the quantity changes along with the price.

"Demand," for the economic analyst, is a concept useful in reasoning and investigation. He does not presume that all influences other than price and quantity do remain fixed over a time period. But he is concerned with uncovering the nature of the net relation between price and quantity and of the differential impacts on price and quantity from the other market influences. To the extent

that he succeeds, the resulting information is of interest and help to the businessman in understanding market developments.

In empirical investigation of the type discussed below with reference to strawberry prices, care must be taken as to just what is being investigated. We do not presume that we are dealing, in a strict and precise sense, with the economic analyst's concept of pure demand. Such a presumption cannot be made for various reasons, including some technical ones which need not be discussed here because of the lack of availability of all relevant data and information and the nature of the information and data which are available. Yet, we do not take the opposite extreme and consider demand only in the sense of quantity purchased. Rather, we deal with a mixture of demand-supply influences of immediate concern to growers and those who purchase from them as they are interrelated and interact upon each other in the marketplace. In other terms, we deal with market behavior relations among prices and quantities and other market influences. Such a relationship of the type we consider between price and quantity differs in essential respects from pure demand of the economic analyst but also bears some affinity in the operating sense of the businessman who is concerned with market behavior. The market behavior relationships we develop and analyze do point up the relations of price to other market influences as the market complex changes over time. One may argue that such market behavior relations are of interest and relevance to the businessman in his operations. One may also have the view that knowledge of such market behavior relations, supplementing experience and business judgment rather than replacing them, provides the industry with a basis for better planning and operations than do general experience and judgment alone. Such a view is more than hypothetical but can be based on what occurs in other agricultural industries with problems similar in many respects to those of the strawberry industry.

Market Behavior Price Relations

The behavioral relations of grower prices to other market variables are analyzed in terms of seasonal or annual totals and averages. This is not to deny that within-the-year developments are of importance. But at this stage of the investigation of the strawberry industry, it is deemed advisable first to develop findings on the annual basis before considering the more complicated situation of shorter time intervals. Also, it may be noted that the annual data reflect seasons which in a marketing sense are meaningful economic time units.

The analyses include data for the postwar period beginning with 1947. The prewar period experienced a well-developed strawberry industry, but it was of a much different nature than in the more recent period. During the past decade and a half, processing in the form of fresh frozen strawberries has emerged as a major segment of the strawberry industry, regional shifts have occurred in production, and the structure of strawberry prices has altered. The differences between the prewar and postwar periods are so large in magnitude and so distinctive in nature that the intermingling of the two periods is not fully meaningful. Since the industry is interested in the current situation and outlook, a more valid basis for analysis is the more recent period of the postwar years.

With the preceding comments as background, we now set forth the results of economic-statistical investigations. For presentation and discussion purposes, the various formulations are classified into Analyses I, II, and III.

The economic data used in developing the set of market behavior price analysis equations grouped in Analysis I are shown in Table 30. It analyzes the trends and annual changes in California and Northwest production and grower prices during the postwar years. Marked changes are evident, reflecting the strong growth in industry production compared with the early postwar years. But growers' prices in recent years, although varying, have been considerably less than in the early postwar years. This has occurred in the face of expanding national income.

There is the question, "Why have the grower prices changed from year to year?" An answer might be, "Because of supply and demand." Such an answer would not be incorrect; but, by itself, it would not be very helpful. Strawberry growers, shippers, processors, and buyers are interested in more specific answers.

To examine the extent to which the grower prices are measurably related to various market influences, various situations may be considered. In fact, this is necessary because alternative combinations of market influences may prevail. Some such combinations can be set forth in the following examples where the symbols (Y_3, X_1, etc.) stand for the market influences explained in the footnotes to Table 30.

Ia: $Y_3 = f(X_3, D_1)$, which means that Y_3 is a function of or is related to a combination of X_3 and D_1.

Ib: $Y_3 = f(X_3, D_1, S_1)$.

Ic: $Y_1 = f(X_1, D_1)$.

TABLE 30

Strawberries: Market Data for Analysis I, 1947-1961

Year	Y_3 [a]	X_3 [b]	D_1 [c]	S_1 [d]	Y_1 [e]	X_1 [f]	X_2 [g]	M_1 [h]	C_1 [i]
1947	20.83	89.148	170.1	247.052	23.6	37.284	51.864	0	2.608
1948	20.44	137.506	189.3	254.094	21.0	51.348	86.158	0	2.745
1949	16.42	116.572	189.7	195.328	18.4	50.908	65.664	1.172	7.731
1950	21.30	147.734	207.7	245.883	20.0	81.282	66.452	4.501	1.442
1951	19.43	140.943	227.5	264.471	20.8	88.113	52.830	6.346	10.231
1952	17.15	204.258	238.7	212.669	18.4	114.912	89.346	6.990	8.019
1953	17.31	258.853	252.5	168.778	17.8	152.938	105.915	8.057	11.335
1954	17.59	262.200	256.9	149.269	19.0	159.467	102.733	10.881	10.941
1955	18.42	289.485	274.4	157.231	20.2	166.740	122.745	12.011	6.511
1956	16.61	323.553	292.9	224.483	16.9	243.200	80.353	11.454	18.078
1957	12.13	357.460	308.8	193.178	14.4	223.560	133.900	13.754	32.765
1958	14.54	319.940	317.9	211.447	15.6	210.800	109.140	14.518	30.679
1959	16.71	305.400	337.3	172.274	19.1	170.280	135.120	14.414	39.271
1960	17.69	275.130	351.8	191.659	20.1	156.780	118.350	27.026	42.649
1961	15.71	321.600	364.9	191.023	17.6	207.000	114.600	31.793	31.306

(Continued on next page.)

Table 30 continued.

a/ Y_3 = Pacific Coast growers' price for strawberries, weighted average for fresh shipping and processing, in cents per pound.

b/ X_3 = Pacific Coast production of strawberries, in million pounds.

c/ D_1 = United States disposable personal income, in billion dollars.

d/ S_1 = Production of strawberries in states other than the Pacific Coast, in million pounds.

e/ Y_1 = California growers' price for strawberries, weighted average for fresh shipping and processing, in cents per pound.

f/ X_1 = California production of strawberries, in million pounds.

g/ X_2 = Northwest (Washington and Oregon) production of strawberries, in million pounds.

h/ M_1 = United States imports of frozen berries, in million pounds.

i/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.

Id: $Y_1 = f(X_1, X_2, D_1)$.

Ie: $Y_1 = f(X_1, X_2, D_1, S_1)$.

If: $Y_1 = f(X_1, X_2, D_1, S_1, M_1, C_1)$.

Which of the two equations--Ia or Ib--better accounts for the behavior of Y_3 (the Pacific Coast growers' price for strawberries, weighted average for fresh shipping and processing)? Which of the four equations--Ic, Id, Ie, or If--best accounts for the behavior of Y_1 (the California growers' price for strawberries, weighted average for fresh shipping and processing)? No unique or ambiguous answer may be determinable, but suggestive evidence can be presented from the views of economic analysis and market operations.

Table 31 presents the market behavior price analysis equations Ia through If, above. Of these equations, only Ic is clearly unacceptable from the view of economic analysis and marketing. But, from the view of statistical analysis, questions may be raised about others of the group of equations in Analysis I (Table 31). In none of the equations is the degree of statistical explanation of the price, accountable for by the other market influences, of a really high order of magnitude. Also, some of the market influences on the price are of doubtful statistical significance. Although the results of Analysis I are not fully satisfactory from the views of economic and statistical analysis, neither are they completely discouraging.

Recognizing the issue of statistical significance and tempering it in light of marketing considerations, it is worthwhile to consider in more detail one of the equations in Analysis I. For that purpose, we select equation If, which is the most complete in the inclusion of market influences and which also in overall terms best accounts for the annual variations in the California strawberry price (weighted average for fresh shipping and processing).

Dealing with average relationships during the period analyzed (1947-1961), the following summary statements can be set forth:

1. A change of 10 million pounds in the California production of strawberries, by itself, was on the average associated with a change in the opposite direction of almost 0.5 cent per pound in the California weighted average price for fresh shipping and processing strawberries.

2. A change of 10 million pounds in Northwest production of strawberries, by itself, was on the average associated with a change in the opposite direction of almost 0.2 cent per pound in the California weighted average price for fresh shipping and processing strawberries.

TABLE 31

Strawberries: Market Behavior Price Analyses Equations for Analysis I, 1947-1961
(Least-squares multiple regression equations)

Equation number	Dependent variable	Constant term	X_1 [a]	X_2 [b]	X_3 [c]	S_1 [d]	M_1 [e]	C_1 [f]	D_1 [g]	N [h]	R^2 [i]	S.E. [j]	D-W [k]
			Figures in parentheses are t-ratios										
Ia	Y_3 [l]	21.705			-0.024 (2.168)				0.006 (0.361)	15	0.58	1.70	2.374
Ib	Y_3 [l]	21.230			-0.024 (1.848)	0.002 (0.114)			0.006 (0.331)	15	0.58	1.77	2.321
Ic	Y_1 [m]	20.580	-0.036 (3.080)						0.013 (1.007)	15	0.61	1.54	1.484
Id	Y_1 [m]	20.659	-0.035 (2.915)	-0.013 (0.450)					0.017 (1.093)	15	0.62	1.59	1.570
Ie	Y_1 [m]	22.407	-0.036 (2.816)	-0.020 (0.585)		-0.006 (0.339)			0.018 (1.098)	15	0.63	1.65	1.674
If	Y_1 [m]	13.493	-0.047 (2.523)	-0.017 (0.425)		-0.001 (0.037)	-0.062 (0.312)	-0.123 (1.233)	0.062 (1.035)	15	0.69	1.68	1.663

a/ X_1 = California production of strawberries, in million pounds.

b/ X_2 = Northwest (Washington and Oregon) production of strawberries, in million pounds.

c/ X_3 = Pacific Coast production of strawberries, in million pounds.

d/ S_1 = production of strawberries in states other than the Pacific Coast, in million pounds.

e/ M_1 = United States imports of frozen berries, in million pounds.

f/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.

g/ D_1 = United States disposable personal income, in billion dollars.

h/ N = number of observations.

i/ R^2 = squared coefficient of multiple correlation.

j/ S.E. = standard error of estimate.

k/ D-W = Durbin-Watson statistic.

l/ Y_3 = Pacific Coast growers' price for strawberries, weighted average for fresh shipping and processing, in cents per pound.

m/ Y_1 = California growers' price for strawberries, weighted average for fresh shipping and processing, in cents per pound.

3. A change of 10 million pounds in the production of strawberries in states other than the Pacific Coast, by itself, was on the average associated with a change in the opposite direction (but of such small magnitude that it was hardly measurable) in the California weighted price for fresh shipping and processing strawberries.

4. A change of 10 million pounds in the United States imports of frozen berries, by itself, was on the average associated with a change in the opposite direction of about 0.6 cent per pound in the California weighted average price for fresh shipping and processing strawberries.

5. A change of 10 million pounds in Pacific Coast cold storage holdings of frozen strawberries, by itself, was on the average associated with a change in the opposite direction of about 1.2 cents per pound in the California weighted average price for fresh shipping and processing strawberries.

6. A change of $10 billion in the United States disposable personal income, by itself, was on the average associated with a change in the same direction of about 0.6 cent per pound in the California weighted average price for fresh shipping and processing strawberries.

Supplementing the above average relationships, it is relevant to note that particular relations (2-4) are of rather shaky statistical significance; that is, those indicated relations may well be more reflective of chance considerations than actual market operations. But knowledge of the strawberry industry and its economic-marketing characteristics suggests that the indicated relationships are meaningful in a qualitative sense, if not in the sense of precise measurement. Further, it is important to note that all of the relationships (1-6) are consistent with economic and marketing considerations in terms of the direction of related changes: price decrease is associated with the quantity increase, and price increase is associated with income increase.

A suggestive, if not definitive, indication of the explanatory power of equation If (Table 31), in terms of the combined influences of the included price-affecting factors, is illustrated in the following tabulation. There are shown, for the period investigated, the actual and estimated annual prices along with the differences between them.

California Strawberries--Grower Prices, 1947-1961
(Weighted average of fresh shipping and processing)

Year	Actual price	Estimated price[a]	Difference
	cents per pound		
1947	23.6	21.0	2.6
1948	21.0	20.9	0.1
1949	18.4	20.6	-2.2
1950	20.0	20.8	-0.8
1951	20.8	20.8	0
1952	18.4	19.9	-1.5
1953	17.8	18.2	-0.4
1954	19.0	18.1	+0.9
1955	20.2	19.0	1.2
1956	16.9	15.9	1.0
1957	14.4	15.0	-0.6
1958	15.6	16.7	-1.1
1959	19.1	18.4	0.7
1960	20.1	19.0	1.1
1961	17.6	18.6	-1.0

a/ Based on equation If in Table 31.

We now turn to a somewhat different approach, which is referred to as Analysis II. The same time period (1947-1961) is considered, but explicit attention is given to fresh shipping and processing strawberries. For each year, both fresh and processing strawberries are considered for California and the Northwest. Pacific Coast cold storage holdings, production in states other than the Pacific Coast, and United States imports of frozen berries and disposable personal income are all included. These data used in Analysis II are brought together in Table 32. It is constructed so that for each year the data are shown for both fresh and processed strawberries (where the relevant data are the same for both fresh and processed, as disposable personal income or Pacific Coast cold storage holdings, they are repeated for the two usages in each year).

The differences in the California grower prices for fresh shipping and processed strawberries are evident from examination of the V_1 column in Table 32; also shown there are the differences in production for the two usages in California (column V_2), the Northwest (column V_4), and the other states (column S_1). Particular attention may be called to the V_3 column, where 0 and 1 are alternate. The 0 is used as a technical factor in the analysis for shifting the market behavior equation to that of fresh shipping strawberries, while the 1 is a technical factor for shifting the market behavior equation to that of processing

TABLE 32

Strawberries: Market Data for Analysis II, 1947-1961

Year	V_1 [a]	V_2 [b]	D_1 [c]	C_1 [d]	V_3 [e]	M_1 [f]	S_1 [g]	V_4 [h]
1947								
Fresh	23.9	30.314	170.1	2.608	0	0	247.052	6.372
Processed	22.4	6.970	170.1	2.608	1	0	247.052	45.492
1948								
Fresh	21.7	40.434	189.3	2.745	0	0	254.094	5.544
Processed	18.2	10.914	189.3	2.745	1	0	254.094	80.614
1949								
Fresh	18.7	43.122	189.7	7.731	0	1.172	195.328	7.286
Processed	17.0	7.786	189.7	7.731	1	1.172	195.328	58.378
1950								
Fresh	20.0	47.724	207.7	1.442	0	4.501	245.883	6.238
Processed	20.0	33.558	207.7	1.442	1	4.501	245.883	60.214
1951								
Fresh	21.3	54.317	227.5	10.231	0	6.346	264.471	6.146
Processed	20.0	33.796	227.5	10.231	1	6.346	264.471	46.682
1952								
Fresh	20.0	68.162	238.7	8.019	0	6.990	212.669	7.236
Processed	16.0	46.750	238.7	8.019	1	6.990	212.669	82.110
1953								
Fresh	19.3	71.712	252.5	11.335	0	8.057	168.778	8.165
Processed	16.5	81.226	252.5	11.335	1	8.057	168.778	97.750
1954								
Fresh	22.6	71.577	256.9	10.941	0	10.881	149.269	8.145
Processed	16.0	87.890	256.9	10.941	1	10.881	149.269	94.588
1955								
Fresh	25.2	64.400	274.4	6.511	0	12.011	157.231	7.451
Processed	17.0	102.340	274.4	6.511	1	12.011	157.231	115.294

(Continued on next page.)

Table 32 continued.

Year	V_1 [a]	V_2 [b]	D_1 [c]	C_1 [d]	V_3 [e]	M_1 [f]	S_1 [g]	V_4 [h]
1956								
Fresh	22.1	88.500	292.9	18.078	0	11.454	224.483	3.828
Processed	14.0	154.700	292.9	18.078	1	11.454	224.483	76.525
1957								
Fresh	17.9	118.260	308.8	32.765	0	13.754	193.178	9.600
Processed	10.4	105.300	308.8	32.765	1	13.754	193.178	124.300
1958								
Fresh	20.1	97.800	317.9	30.679	0	14.518	211.447	7.340
Processed	11.7	113.000	317.9	30.679	1	14.518	211.447	101.800
1959								
Fresh	23.0	96.280	337.3	39.271	0	14.414	172.274	7.220
Processed	14.0	74.000	337.3	39.271	1	14.414	172.274	127.900
1960								
Fresh	24.1	85.780	351.8	42.649	0	27.026	191.659	6.250
Processed	15.3	71.000	351.8	42.649	1	27.026	191.659	112.100
1961								
Fresh	21.2	134.000	364.9	31.306	0	31.793	191.023	6.420
Processed	11.0	73.000	364.9	31.306	1	31.793	191.023	108.180

a/ V_1 = California growers' price for strawberries, in cents per pound.

b/ V_2 = California production of strawberries, in million pounds.

c/ D_1 = United States disposable personal income, in billion dollars.

d/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.

e/ V_3 = Usage factor; 0 = fresh shipping, 1 = processed.

f/ M_1 = United States imports of frozen berries, in million pounds.

g/ S_1 = Production of strawberries in states other than the Pacific Coast, in million pounds.

h/ V_4 = Northwest (Washington and Oregon) production of strawberries, in million pounds.

strawberries. These are technical matters noted here only to indicate that Analysis II is constructed to deal with either fresh shipping or processing strawberries produced in California.

Referring to the meaning of the symbols V_1, V_2, etc., explained in the footnotes to Table 32 and standing for the various market influences reflected in Analysis II, there is the question as to what combination of market influences account for the behavior of grower prices (fresh shipping and processing strawberries). The following alternatives are considered:

IIa: $V_1 = f(V_2, D_1, C_1, V_3)$, which means that V_1 is a function of or is related to a combination of V_2, D_1, C_1, and V_3.

IIb: $V_1 = f(V_2, D_1, C_1, M_1, V_3)$.

IIc: $V_1 = f(V_2, D_1, C_1, S_1, M_1, V_4, V_3)$.

Market behavior equation IIa sets forth the hypothesis that year-to-year changes in the California grower price of strawberries is accounted for by the combined influences of annual changes in California production, Pacific Coast cold storage holdings, and United States disposable personal income, with fresh shipping strawberries being considered when V_3 equals 0 and processing strawberries being considered when V_3 equals 1. Equation IIb is more inclusive than IIa, in that the influence of United States imports of frozen berries is added. Equation IIc is the most comprehensive of Analysis II: Northwest production of strawberries and the production in states other than the Pacific Coast are added to the market influences included in IIb.

We next may turn to examination of the results of Analysis II. They are summarized in Table 33 where market behavior equations IIa, IIb, and IIc are shown. The results are not acceptable, although they do merit comment. Equation IIa is more encouraging than IIb, since the latter does not have an economically acceptable relation between the price and United States imports of frozen berries; in fact, the influence of imports is very weak in IIb and does not contribute in a statistical sense to the analysis. Yet, neither equation IIa nor equation IIb is adequate as a basis for market analysis.

In market behavior equation IIc, the influences of California and Northwest production stand out prominently. Yet, the other influences are not captured adequately. Although the price relations are acceptable in a qualitative economic sense, for other states' production, United States frozen imports, Pacific Coast cold storage holdings, and United States disposable personal income,

TABLE 33

Strawberries: Market Behavior Price Analyses Equations for Analysis II, 1947-1961
(Least-squares multiple regression equations)

Equation number	Dependent variable	Constant term	V_2 [a]	V_4 [b]	S_1 [c]	M_1 [d]	C_1 [e]	D_1 [f]	V_3 [g]	N [h]	R^2 [i]	S.E. [j]	D-W [k]
			Figures in parentheses are t-ratios										
IIa	V_1 [l]	21.034	-0.044 (2.097)				-0.098 (1.208)	0.020 (0.864)	-5.760 (6.313)	30	0.66	2.46	2.052
IIb	V_1 [l]	21.530	-0.043 (1.805)			0.014 (0.084)	-0.096 (1.065)	0.017 (0.413)	-5.753 (6.159)	30	0.66	2.51	2.052
IIc	V_1 [l]	20.151	-0.040 (2.012)	-0.094 (3.409)	-0.013 (0.924)	-0.054 (0.386)	-0.088 (1.120)	0.036 (0.989)	1.983 (0.825)	30	0.78	2.12	1.124

a/ V_2 = California production of strawberries, in million pounds.

b/ V_4 = Northwest (Washington and Oregon) production of strawberries, in million pounds.

c/ S_1 = production of strawberries in states other than the Pacific Coast, in million pounds.

d/ M_1 = United States imports of frozen berries, in million pounds.

e/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.

f/ D_1 = United States disposable personal income, in billion dollars.

g/ V_3 = usage factor; 0 = fresh shipping, 1 = processed.

h/ N = number of observations.

i/ R^2 = squared coefficient of multiple correlation.

j/ S.E. = standard error of estimate.

k/ D-W = Durbin-Watson statistic.

l/ V_1 = California growers' price for strawberries, in cents per pound.

the usage factor (fresh shipping or processing) relation is highly doubtful. Market experience and our other investigations indicate that the market demand for fresh shipping strawberries is at a higher level than the demand for processing berries; in other terms, for a given quantity and other fixed influences, the grower price for fresh shipping is higher than that for processing strawberries. But the results of equation IIc are not consistent with that view and also cannot be judged as acceptable in terms of statistical significance.

For these reasons, among others, equation IIc cannot be taken seriously. The reporting of it here, along with the rest of Analysis II, is to indicate for the record the nature of the results emerging from Analysis II. It was not pursued further because an alternative approach was used in investigating the price relations for fresh shipping and processing strawberries produced in California. It is believed that that the particular statistical formulation used in Analysis II accounts for its inadequate results rather than the market influences considered. Hence, we next turn to an alternative approach.

Still interested in price analysis of California grower prices for fresh shipping and processing strawberries, we now consider a third group of market behavior equations referred to as Analysis III. The period again investigated includes the postwar years 1947-1961. The market influences considered are, in the main, the same as those in Analysis II, but now we take a different line of attack and formulate the analysis somewhat differently. As will be noted later, some of the results are more encouraging.

Table 34 summarizes for convenience the market influences examined in Analysis III equations. They need not be identified here again since they are clearly set forth in Table 32 and its explanatory footnotes, as well as in Table 34.

To indicate various hypotheses considered with respect to the price-affecting market influences, the following formulations are noted:

IIIa: $W_1 = f(Z_1, Z_2, D_1)$, which means that W_1 is a function of or is related to Z_1, Z_2, and D_1.

IIIb: $W_1 = f(Z_1, Z_2, D_1, M_1)$.

IIIc: $W_2 = f(Z_1, Z_2, D_1)$.

IIId: $W_2 = f(Z_1, Z_2, D_1, M_1)$.

IIIe: $W_2 = f(Z_2, Z_4, D_1, M_1)$.

TABLE 34

Strawberries: Market Data for Analysis III, 1947-1961

Year	W_1 [a]	W_2 [b]	Z_1 [c]	Z_2 [d]	D_1 [e]	M_1 [f]	Z_4 [g]	U_3 [h]	C_1 [i]	C_3 [j]
1947	23.9	22.4	30.314	6.970	170.1	0	45.492	24.106	2.608	17.675
1948	21.7	18.2	40.434	10.914	189.3	0	80.614	49.810	2.745	15.908
1949	18.7	17.0	43.122	7.786	189.7	1.172	58.378	25.963	7.731	36.370
1950	20.0	20.0	47.724	33.558	207.7	4.501	60.214	76.888	1.442	11.077
1951	21.3	20.0	54.317	33.796	227.5	6.346	46.682	63.768	10.231	49.859
1952	20.0	16.0	68.162	46.750	238.7	6.990	82.110	59.350	8.019	41.494
1953	19.3	16.5	71.712	81.226	252.5	8.057	97.750	33.979	11.335	45.428
1954	22.6	16.0	71.577	87.890	256.9	10.881	94.588	40.341	10.941	51.543
1955	25.2	17.0	64.400	102.340	274.4	12.011	115.294	41.659	6.511	40.633
1956	22.1	14.0	88.500	154.700	292.9	11.454	76.525	75.743	18.078	64.995
1957	17.9	10.4	118.260	105.300	308.8	13.754	124.300	38.258	32.765	102.346
1958	20.1	11.7	97.800	113.000	317.9	14.518	101.800	51.193	30.679	84.201
1959	23.0	14.0	96.280	74.000	337.3	14.414	127.900	39.001	39.271	88.659
1960	24.1	15.3	85.780	71.000	351.8	27.026	112.100	45.780	42.649	84.648
1961	21.2	11.0	134.000	73.000	364.9	31.793	108.180	41.394	31.306	89.486

a/ W_1 = California growers' price for fresh shipping strawberries, in cents per pound.
b/ W_2 = California growers' price for processing strawberries, in cents per pound.
c/ Z_1 = California production of fresh shipping strawberries, in million pounds.
d/ Z_2 = California production of processing strawberries, in million pounds.
e/ D_1 = United States disposable personal income, in billion dollars.
f/ M_1 = United States imports of frozen berries, in million pounds.
g/ Z_4 = Northwest (Washington and Oregon) production of processing strawberries, in million pounds.
h/ U_3 = Production of processing strawberries in states other than the Pacific Coast, in million pounds.
i/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.
j/ C_3 = United States cold storage holdings of frozen strawberries, May 1, in million pounds.

IIIf: $W_2 = f(Z_2, Z_4, D_1, M_1, V_3)$.

IIIg: $W_2 = f(Z_2, C_1, D_1, M_1)$.

IIIh: $W_2 = f(Z_2, Z_4, D_1, M_1, V_3, C_3)$.

Each of the above eight formulations were investigated. The statistical results are summarized in the corresponding equations in Table 35. The following comments may be noted.

Of the eight equations in Table 32, six are not acceptable because of economic-marketing reasons, statistical criteria, or a combination of the two. Equations IIIc and IIIh are the most acceptable or least unacceptable. In terms of economic-marketing criteria, both IIIc and IIIh merit consideration and acceptance. From the view of precise and rigid statistical criteria, questions may be raised, with the seriousness of the questions depending on the attitude one takes toward measures of "statistical significance" in such economic-statistical formulations as these. Yet, the results of equations IIIc and IIIh are deemed to be worthy of note.

Equation IIIc reflects the view that the annual average grower price of California processing strawberries is adversely affected by the volume of California processing strawberries and by the volume of Northwest processing strawberries and is positively affected by the level of United States personal disposable income. This is a rather simple formulation, considering the complexity of the California processing strawberry industry. Yet, the results of the formulation (equation IIIc) are at least encouraging.

The meaning of the formulation reflected by equation IIIc may be summarized as follows:

1. A change of 10 million pounds in the California production of fresh shipping strawberries, by itself, was on the average associated with a change in the opposite direction of 1.2 cents per pound in the California grower price of processing strawberries.

2. A change of 10 million pounds in the California production of processing strawberries, by itself, was on the average associated with a change in the opposite direction of less than 0.5 cent per pound in the California grower price of processing strawberries.

3. A change of $10 billion in United States personal disposable income, by itself, was on the average associated with a change in the same direction of less than 0.5 cent per pound in the California grower price of processing strawberries.

TABLE 35

Strawberries: Market Behavior Price Analyses Equations for Analysis III, 1947-1961
(Least-squares multiple regression equations)

Equation number	Dependent variable	Constant term	Z_1 [a]	Z_2 [b]	Z_4 [c]	U_3 [d]	M_1 [e]	C_1 [f]	C_3 [g]	D_1 [h]	N [i]	R^2 [j]	S.E. [k]	D-W [l]
			Figures in parentheses are t-ratios											
IIIa	W_1 [m]	15.157	-0.132 (3.579)	0.006 (0.451)						0.059 (3.328)	15	0.55	1.60	1.380
IIIb	W_1 [m]	19.622	-0.134 (3.640)	0.015 (0.928)			0.160 (1.092)			0.034 (1.166)	15	0.59	1.59	1.968
IIIc	W_2 [n]	22.352	-0.122 (3.900)	-0.010 (0.882)						0.013 (0.838)	15	0.88	1.35	2.001
IIId	W_2 [n]	26.747	-0.123 (4.056)	-0.002 (0.162)			0.157 (1.303)			-0.012 (0.512)	15	0.90	1.31	2.350
IIIe	W_2 [n]	29.300		-0.012 (0.589)	-0.028 (7.341)		0.088 (0.425)			-0.042 (1.009)	15	0.74	2.07	1.981
IIIf	W_2 [n]	28.709		-0.015 (0.660)	-0.018 (0.399)	0.018 (0.406)	0.101 (0.465)			-0.046 (1.032)	15	0.74	2.17	1.896
IIIg	W_2 [n]	27.614		-0.017 (0.615)			0.095 (0.400)	-0.045 (0.354)		-0.041 (0.640)	15	0.73	2.12	2.082
IIIh	W_2 [n]	16.740		-0.017 (0.915)	-0.065 (1.491)	-0.037 (0.822)	-0.182 (0.820)		-0.118 (2.213)	0.062 (1.012)	15	0.84	1.81	2.318

(Continued on next page.)

Table 35 continued.

a/ Z_1 = California production of fresh shipping strawberries, in million pounds.

b/ Z_2 = California production of processing strawberries, in million pounds.

c/ Z_4 = Northwest (Washington and Oregon) production of processing strawberries, in million pounds.

d/ U_3 = production of processing strawberries in states other than the Pacific Coast, in million pounds.

e/ M_1 = United States imports of frozen berries, in million pounds.

f/ C_1 = Pacific Coast cold storage holdings of frozen strawberries, May 1, in million pounds.

g/ C_3 = United States cold storage holdings of frozen strawberries, May 1, in million pounds.

h/ D_1 = United States disposable personal income, in billion dollars.

i/ N = number of observations.

j/ R^2 = squared coefficient of multiple correlation.

k/ S.E. = standard error of estimate.

l/ D-W = Durbin-Watson statistic.

m/ W_1 = California growers' price for fresh shipping strawberries, in cents per pound.

n/ W_2 = California growers' price for processing strawberries, in cents per pound.

The extent to which equation IIIc accounts for the market behavior of the California grower price of processing strawberries is indicated by the following tabulation showing the actual and equation-estimated prices and the differences between them.

California Grower Prices for Processing Strawberries, 1947-1961

Year	Actual price	Estimated price[a/]	Difference
	cents per pound		
1947	22.4	20.7	1.7
1948	18.2	19.7	-1.5
1949	17.0	19.4	-2.4
1950	20.0	18.8	1.2
1951	20.0	18.2	1.8
1952	16.0	16.6	-0.6
1953	16.5	16.0	0.5
1954	16.0	16.0	0
1955	17.0	16.9	0.1
1956	14.0	13.6	0.3
1957	10.4	10.8	-0.4
1958	11.7	13.3	-1.6
1959	14.0	14.1	-0.1
1960	15.3	15.6	-0.3
1961	11.0	9.9	1.1

a/ Based on equation IIIc in Table 35.

Next we turn to equation IIIh, which sets forth an alternative economic-marketing view of the influences underlying the market behavior of California grower prices of processing strawberries. Compared with equation IIIc, equation IIIh is more comprehensive, including California grower price and production of processing strawberries, Northwest production of processing strawberries, production of processing strawberries in states other than the Pacific Coast, United States imports of frozen berries, United States cold storage holdings of frozen strawberries, and United States personal disposable income. This combination of influences, in terms of effects on the grower price as reflected by equation IIIh, is acceptable on economic criteria; that is, the signs of the coefficients of equation IIIh are consistent with what is expected from economic principles.

The essence of equation IIIh is summarized verbally as follows:

1. A change of 10 million pounds in the California production of processing strawberries, by itself, was on the average associated with a change in the

opposite direction of less than 0.5 cent per pound in the California grower price of processing strawberries.

2. A change of 10 million pounds in the Northwest production of processing strawberries, by itself, was on the average associated with a change in the opposite direction of slightly more than 0.5 cent per pound in the California grower price of processing strawberries.

3. A change of 10 million pounds in the processing strawberry production in states other than the Pacific Coast, by itself, was on the average associated with a change in the opposite direction of less than 0.5 cent per pound in the California grower price of processing strawberries.

4. A change of 5 million pounds in United States imports of frozen berries, by itself, was on the average associated with a change of somewhat less than 1 cent per pound in the California grower price of processing strawberries.1/

5. A change of 5 million pounds in United States cold storage holdings of frozen strawberries (April 30), by itself, was on the average associated with a change in the opposite direction of about 0.5 cent per pound in the California grower price of processing strawberries.

6. A change of $10 billion in United States disposable personal income, by itself, was on the average associated with a change in the same direction of about 0.5 cent per pound in the California grower price of processing strawberries.

To indicate the extent to which these relationships from equation IIIh interact and in combination reflect the operation of the market to yield

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1/ There is the question as to why the apparent average price effect of imports is larger than that of domestic production. There is no unequivocal answer, although the following considerations are relevant. The comparative levels and degrees of fluctuations in the import and domestic volumes are much different. A change of, say, 5 million pounds is much greater, relatively, for imports than for domestic production (in a technical sense, the changes are viewed from an average which for imports is much less than for the domestic volumes). Also, the imports reflect a strong uptrend throughout the entire period, in contrast to the domestic volumes. But, of particular relevance is the fact that the measured price effects are not of sufficient statistical significance to be viewed precisely. An essential point, for present purposes, is the suggestive, if not fully persuasive, evidence that imports of frozen berries do, on the average, tend to have a depressing effect on California grower price of processing strawberries.

estimated grower prices which compare with the actual ones, the following tabulation is presented.

California Grower Prices for Processing Strawberries, 1947-1961

Year	Actual price	Estimated price[a]	Difference
	cents per pound		
1947	22.4	21.2	1.2
1948	18.2	19.3	-1.1
1949	17.0	19.0	-2.0
1950	20.0	20.1	-0.1
1951	20.0	17.7	2.3
1952	16.0	16.9	-0.9
1953	16.5	16.5	0
1954	16.0	15.4	0.6
1955	17.0	15.9	1.1
1956	14.0	14.6	-0.6
1957	10.4	9.9	0.5
1958	11.7	13.3	-1.6
1959	14.0	13.4	0.6
1960	15.3	13.3	2.0
1961	11.0	13.0	-2.0

a/ Based on equation IIIh in Table 35.

It is of interest to note that, despite the more comprehensive inclusion of market influences in equation IIIh, its explanatory power with respect to the market behavior of the grower price is in overall terms somewhat under that of equation IIIc. This is particularly so in the two recent years 1960 and 1961. It is suggested that the influence of United States imports of frozen berries is not adequately reflected by equation IIIh for 1960 and 1961. In those two years the imports increased sharply above levels of earlier years, although the equation embodied the variation of imports in those earlier years. Hence, in the further investigation of the subject and improvement of equation IIIh formulation, a more adequate account of the influence of imports of frozen berries is in order.

VII. A Summary View

In the preceding sections of the report, a detailed picture of the strawberry industry has been presented. Attention was directed to trends and variations in production, acreage, yield, utilization, and industry developments; also, interactions and relations among major producing regions were considered. From the descriptive record emerged the historical fact that the strawberry industry during the decades following World War II has experienced important changes. Production patterns among producing regions and utilization-consumption tendencies among first handlers and by final consumers were affected. The strawberry industry during the past decade and a half has taken on new characteristics, including technological and economic changes. Not only has field production been affected but also fresh shipping and processing; and, in the processing segment, interregional aspects are now superimposed on the regional relationships prevalent when the industry in the pre-World War II years was in most part dominated by fresh shipments.

The conclusions drawn from the description of the strawberry industry, with special emphasis on California, have been traced in order to give a firm foundation for the analysis of influences on strawberry grower prices in California. The importance of California's position as the primary producer of strawberries in the postwar period and the development of the quick-frozen strawberry as the major use of the product during the growth period were highlighted by the data. The emergence of the Pacific Coast as the dominant region of production for both fresh and frozen berries has been clearly established, together with the unique position of California within this regional complex.

Observations were sifted from both the growth and adjustment periods, searching for general and specific factors which seemed particularly to influence California grower prices, and various hypotheses were then tested for effects, within the limits of the data available. A shift to processing utilization was most noticeable in the growth period of the 1950's, with a return to the seemingly more profitable fresh outlet for strawberries in California as production for processing apparently outstripped the demand for frozen berries in most recent years. The opportunities for California growers to choose between fresh and processing for their crop seemed over time to be an additional unique facet available to the industry, already assisted by the climatic ability to sustain high-yield acreage over a longer season than any other single commercial producing area.

The interesting relationship between the production and price of fresh and frozen strawberries upon further investigation seems to indicate that for the industry as a whole the frozen strawberry has been a competitive rather than a supplementary product for fresh strawberries. The introduction of frozen strawberries, therefore, not only influenced grower prices for the total crop but presented to the California grower a further complex of economic-marketing factors which previously was outside the range of experience of the producer of a seasonal crop with specified constraints. Postwar consumption figures indicate that per capita consumption of all strawberries, fresh and frozen combined, is not as great as in the prewar period, when fresh strawberries were the major utilization. The long-run implications of this observation, although by no means unique for California, are yet to be fully interpreted both for the grower and for the food industry. The identification and relative importance of many of these influences for the necessary decision making of the California strawberry industry have been the focus of this study.

As the price analyses are further investigated and improved, they may provide information and data useful in market planning and industry operations. The results obtained and summarized in this progress report may be viewed as suggestive, if not firm, indications of the effects of market influences on California grower prices of strawberries. The major economic-marketing influences are identified, and their price effects are estimated. The degree of confidence worthy of the estimated price effects is subject to standards of statistical significance but particularly of testing in light of market developments and experience. In the meantime, the following emergent market relationships merit consideration and attention by the industry.

The level of California strawberry production affects the average price received by California growers, but so does strawberry production in the Northwest to a considerable extent. There is suggestive evidence that United States imports of frozen berries and the level of cold storage holdings (April 30) affect the California grower average price for the season. All of these influences are inversely related to the price: as these factors increase, the price tends to decrease and vice versa. There is some basis for the view that, as the level of United States disposable income advances, the demand for California strawberries responds favorably. This relationship is reasonable, although it does not appear sharply or strongly in the analyses.

The California grower average price for fresh shipping strawberries is affected by the volume of California fresh production: increased volume tends to bring with it price decline and vice versa. It may be suspected that the volume of California processing strawberries adversely affects the California fresh price, but the statistical evidence is not clear or convincing. Yet, the level of United States disposable income appears to have an effect on the California fresh price, with income advances being reflected by increased demand for fresh shipping strawberries.

For California processing strawberries, the grower average price is affected by production for processing in California, the Northwest, and other leading producing states: production increases tend to be associated with price decreases. The same type of price effect may be attributed to United States imports of frozen berries and to the level of cold storage holdings of frozen strawberries. But United States income advances tend to be reflected, apparently slightly, by uplift of the demand for processing strawberries.

An essential point is the interaction of the strawberry industries in California and the Pacific Northwest, particularly in the processing segment of the Pacific Coast strawberry industry. In an economic-marketing sense, the two producing areas are interlocked, with developments in one affecting and being affected by developments in the other. In the past several years, a somewhat similar tendency has emerged with respect to the processing strawberry industry of Mexico and that of the United States.

The types of market behavior price relationships summarized above are relevant to the California strawberry industry and its components and participants in the production planning, marketing, and pricing policies and practices. The industry is not isolated or protected from the influences and impacts of economic-marketing forces. Rather, the issue is the extent to which the industry takes advantage of economic-marketing factors which affect the strawberry industry and its price behavior.

STATISTICAL APPENDIX TABLES

Sources for Statistical Appendix Tables

Acreage, Production, Yield, and Season Average Prices

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1960-1962: _____. Vegetables--Fresh Market: Acreage, Production and Value of Principal Commercial Crops by Seasonal Groups and States, annual issues.

Frozen-Pack

California Federal-State Market News Service, Marketing California Strawberries (San Francisco, annual issues since 1952).

Cold Storage Holdings

U. S. Statistical Reporting Service, Summary of Regional Cold Storage Holdings, annual issues.

_____. Cold Storage Report, monthly issues.

APPENDIX TABLE I

Strawberry Acreage for Harvest: United States, Selected States, and Seasonal Groups, 1924-1962

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
	acres									
Winter	4,690	4,240	2,980	3,680	4,500	6,300	8,800	9,100	7,800	10,600
Florida	4,690	4,240	2,980	3,680	4,500	6,300	8,800	9,100	7,800	10,600
Early spring	19,630	14,760	22,840	26,500	29,620	32,800	30,600	26,250	30,100	26,200
Louisiana	14,600	10,340	18,500	21,100	23,200	24,000	22,000	20,500	23,000	18,800
Others	5,030	4,420	4,340	5,400	6,420	8,800	8,600	5,750	7,100	7,400
Midspring	106,320	85,330	84,560	115,060	125,770	118,590	89,170	70,240	95,890	110,090
California	3,740	3,400	3,300	4,550	4,250	4,100	4,400	4,450	4,500	4,700
Others	102,580	81,930	81,260	110,510	121,520	114,490	84,770	65,790	91,390	105,390
Late spring	45,800	41,800	43,580	46,700	47,740	49,200	49,900	50,600	57,200	50,600
Michigan	7,800	6,800	6,600	6,800	6,000	6,900	8,200	8,200	10,400	10,800
Oregon	6,000	6,200	7,600	8,800	10,800	11,800	11,200	12,400	13,200	7,400
Others[a/]	32,000	28,800	29,380	31,100	30,940	30,500	30,500	30,000	33,600	32,400
United States total	176,440	146,130	153,960	191,940	207,630	206,890	178,470	156,190	190,990	197,490
California as percent of midspring	3.5	4.0	3.9	4.0	3.4	3.4	4.9	6.3	4.7	4.3
	percent of United States total									
Winter	2.7	2.9	2.0	1.9	2.2	3.0	4.9	5.8	4.1	5.4
Florida	2.7	2.9	2.0	1.9	2.2	3.0	4.9	5.8	4.1	5.4
Early spring	11.1	10.1	14.8	13.8	14.3	15.9	17.1	16.8	15.8	13.3
Louisiana	8.3	7.1	12.0	11.0	11.2	11.6	12.3	13.1	12.0	9.5
Others	2.8	3.0	2.8	2.8	3.1	4.3	4.8	3.7	3.8	3.8
Midspring	60.2	58.4	54.9	60.0	60.5	57.3	50.0	45.0	50.2	55.7
California	2.1	2.3	2.1	2.4	2.0	2.0	2.5	2.8	2.4	2.4
Others	58.1	56.1	52.8	57.6	58.5	55.3	47.5	42.2	47.8	53.3
Late spring	26.0	28.6	28.3	24.3	23.0	23.8	28.0	32.4	29.9	25.6
Michigan	4.4	4.7	4.3	3.5	2.9	3.3	4.6	5.2	5.4	5.5
Oregon	3.4	4.2	4.9	4.6	5.2	5.7	6.3	7.9	6.9	3.7
Others[a/]	18.2	19.7	19.1	16.2	14.9	14.8	17.1	19.3	17.6	16.4
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Continued on next page.)

Appendix Table I continued.

	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
	acres									
Winter	8,400	8,000	8,900	8,800	7,500	9,000	7,200	5,500	5,000	2,600
Florida	8,400	8,000	8,900	8,800	7,500	9,000	7,200	5,500	5,000	2,600
Early spring	26,540	24,950	19,900	22,650	27,250	29,200	26,500	28,900	25,400	17,000
Louisiana	19,400	18,800	14,800	17,600	22,000	23,100	20,700	22,600	20,500	13,900
Others	7,140	6,150	5,100	5,050	5,250	6,100	5,800	6,300	4,900	3,100
Midspring	109,820	77,350	77,320	63,200	69,060	77,000	70,750	76,970	74,780	51,840
California	4,800	4,800	4,700	4,650	5,030	5,200	5,800	6,100	5,300	1,900
Others	105,020	72,550	72,620	58,550	64,030	71,800	64,950	70,870	69,480	49,940
Late spring	52,500	48,700	49,200	48,900	51,500	59,600	61,900	59,200	50,900	37,900
Michigan	11,000	10,300	10,000	9,000	9,500	10,500	11,400	10,300	8,200	6,400
Oregon	10,400	9,900	10,900	11,200	12,400	11,300	12,500	13,500	11,900	7,500
Others[a/]	31,100	28,500	28,300	28,700	29,600	37,800	38,000	35,400	30,800	24,000
United States total	197,260	159,000	155,320	143,550	155,310	174,800	166,350	170,570	156,080	109,340
California as percent of midspring	4.4	6.2	6.1	7.4	7.3	6.8	8.2	7.9	7.1	3.7
	percent of United States total									
Winter	4.3	5.1	5.7	6.1	4.8	5.1	4.4	3.3	3.2	2.4
Florida	4.3	5.1	5.7	6.1	4.8	5.1	4.4	3.3	3.2	2.4
Early spring	13.4	15.7	12.8	15.8	17.5	16.7	15.9	16.9	16.3	15.5
Louisiana	9.8	11.8	9.5	12.3	14.2	13.2	12.4	13.2	13.1	12.7
Others	3.6	3.9	3.3	3.5	3.3	3.5	3.5	3.7	3.2	2.8
Midspring	55.7	48.6	49.8	44.0	44.5	44.1	42.5	45.1	47.9	47.4
California	2.4	3.0	3.0	3.2	3.2	3.0	3.5	3.6	3.4	1.7
Others	53.3	45.6	46.8	40.8	41.3	41.1	39.0	41.5	44.5	45.7
Late spring	26.6	30.6	31.7	34.1	33.2	34.1	37.2	34.7	32.6	34.7
Michigan	5.6	6.5	6.4	6.3	6.1	6.0	6.9	6.0	5.3	5.9
Oregon	5.3	6.2	7.0	7.8	8.0	6.5	7.5	7.9	7.6	6.9
Others[a/]	15.7	17.9	18.3	20.0	19.1	21.6	22.8	20.8	19.7	21.9
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table I continued.

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
	acres									
Winter	1,400	2,100	2,800	4,800	4,200	4,000	5,400	6,000	3,900	3,700
Florida	1,400	2,100	2,800	4,800	4,200	4,000	5,400	6,000	3,900	3,700
Early spring	11,850	12,900	17,900	20,550	17,600	15,950	15,800	15,700	7,700	9,700
Louisiana	9,500	10,500	15,400	17,800	14,400	13,400	13,300	13,400	5,800	8,100
Others	2,350	2,400	2,500	2,750	3,200	2,550	2,500	2,300	1,900	1,600
Midspring	33,050	31,100	36,450	45,650	48,750	49,400	56,830	66,870	61,000	38,400
California	1,200	1,100	1,900	3,200	4,000	4,400	5,700	6,900	8,400	9,400
Others	31,850	30,000	34,550	42,450	44,750	45,000	51,130	59,970	52,600	29,000
Late spring	30,600	29,300	33,100	41,350	46,100	46,800	48,000	50,550	50,750	47,800
Michigan	5,700	5,000	6,700	8,000	8,500	7,600	8,400	9,300	9,900	9,100
Washington						8,000	7,200	8,000	8,300	8 500
Oregon	5,300	6,000	7,500	11,000	15,000	14,000	14,000	14,500	15,300	15,500
Others[a]	19,600	18,300	18,900	22,350	22,600	17,200	18,400	18,750	17,250	14,700
United States total	76,900	75,400	90,250	112,350	116,650	116,150	126,030	139,120	123,350	99,600
California as percent of midspring	3.6	3.5	5.2	7.0	8.2	8.9	10.0	10.3	13.8	24.5
	percent of United States total									
Winter	1.8	2.8	3.1	4.3	3.6	3.4	4.3	4.3	3.2	3.7
Florida	1.8	2.8	3.1	4.3	3.6	3.4	4.3	4.3	3.2	3.7
Early spring	15.4	17.1	19.8	18.3	15.1	13.7	12.5	11.3	6.2	9.7
Louisiana	12.4	13.9	17.1	15.8	12.3	11.5	10.6	9.6	4.7	8.1
Others	3.0	3.2	2.7	2.5	2.8	2.2	1.9	1.7	1.5	1.6
Midspring	43.0	41.2	40.4	40.6	41.8	42.6	45.1	48.1	49.5	38.6
California	1.6	1.4	2.1	2.8	3.4	3.8	4.5	5.0	6.8	9.4
Others	41.4	39.8	38.3	37.8	38.4	38.8	40.6	43.1	42.7	29.2
Late spring	39.8	38.9	36.7	36.8	39.5	40.3	38.1	36.3	41.1	48.0
Michigan	7.4	6.6	7.4	7.1	7.3	6.5	6.7	6.7	8.0	9.1
Washington						6.9	5.7	5.7	6.7	8.5
Oregon	6.9	8.0	8.3	9.8	12.8	12.1	11.1	10.4	12.4	15.6
Others[a]	25.5	24.3	21.0	19.9	19.4	14.8	14.6	13.5	14.0	14.8
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table I continued.

	1954	1955	1956	1957	1958	1959	1960	1961	1962
					acres				
Winter	2,600	3,400	3,700	3,500	2,000	1,500	1,400	1,800	1,900
Florida	2,600	3,400	3,700	3,500	2,000	1,500	1,400	1,800	1,900
Early spring	10,900	8,500	9,800	9,150	8,450	8,100	8,550	8,600	9,600
Louisiana	9,300	7,100	8,400	7,600	6,700	6,500	6,900	6,800	7,800
Others	1,600	1,400	1,400	1,550	1,750	1,600	1,650	1,800	1,800
Midspring	36,250	38,710	55,430	57,400	50,800	40,900	39,300	37,200	36,450
California	10,900	14,000	19,000	20,700	17,000	13,200	11,700	11,500	10,500
Others	25,350	24,710	36,430	36,700	33,800	27,700	27,600	25,700	25,950
Late spring	46,450	49,880	45,780	52,120	47,980	46,060	46,480	44,320	47,020
Michigan	9,300	10,200	11,200	11,600	10,800	9,500	9,600	9,300	9,500
Washington	8,500	8,500	3,500	8,000	7,500	7,000	6,900	6,800	7,300
Oregon	15,200	17,500	16,800	18,300	15,600	15,600	15,000	14,100	15,500
Others	13,450	13,680	14,280	14,220	14,080	14,160	14,980	14,120	14,720
United States total	96,200	100,490	114,710	122,170	109,230	96,560	95,730	91,920	94,970
California as percent of midspring	30.1	36.2	34.3	36.1	33.5	32.3	29.8	30.9	28.8
					percent of United States total				
Winter	2.7	3.4	3.2	2.9	1.8	1.6	1.5	2.0	2.0
Florida	2.7	3.4	3.2	2.9	1.8	1.6	1.5	2.0	2.0
Early spring	11.3	8.5	8.5	7.5	7.7	8.4	8.9	9.4	10.1
Louisiana	9.7	7.1	7.3	6.2	6.1	6.7	7.2	7.4	8.2
Others	1.7	1.4	1.2	1.3	1.6	1.7	1.7	2.0	1.9
Midspring	37.7	38.5	48.3	47.0	46.5	42.4	41.0	40.5	38.4
California	11.3	13.9	16.6	16.9	15.6	13.7	12.2	12.5	11.1
Others	26.4	24.6	31.8	30.0	30.9	28.7	28.8	28.0	27.3
Late spring	48.3	49.6	39.9	42.7	43.9	47.7	48.6	48.2	49.5
Michigan	9.7	10.2	9.8	9.5	9.9	9.8	10.0	10.1	10.0
Washington	8.8	8.5	3.1	6.5	6.9	7.2	7.2	7.4	7.7
Oregon	15.8	17.4	14.6	15.0	14.3	16.2	15.7	15.3	16.3
Others	14.0	13.6	12.4	11.6	12.9	14.7	15.7	15.4	15.5
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Includes Washington through 1948.

APPENDIX TABLE II

Total Strawberry Production for All Uses: United States, Selected States, and Seasonal Groups, 1924-1962

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
	thousand crates									
Winter	281	301	200	287	230	548	590	655	616	774
Florida	281	301	200	287	230	548	590	655	616	774
Early spring	1,029	703	1,294	1,085	1,796	1,836	1,324	2,436	1,989	1,742
Louisiana	745	434	1,036	696	1,346	1,248	968	1,845	1,541	1,278
Others	284	269	258	389	450	588	356	591	448	464
Midspring	7,427	5,628	5,484	7,443	7,405	7,205	4,415	4,691	6,049	6,667
California	560	565	497	750	869	747	968	868	945	987
Others	6,867	5,063	4,987	6,693	6,536	6,458	3,447	3,823	5,104	5,680
Late spring	3,500	2,277	3,224	3,736	3,453	3,297	2,814	3,745	4,434	3,004
Michigan	647	143	422	564	366	448	533	779	780	648
Oregon	402	570	555	625	842	779	672	868	1,056	355
Others[a/]	2,451	1,564	2,247	2,547	2,245	2,070	1,609	2,098	2,598	2,001
United States total	12,237	8,909	10,202	12,551	12,884	12,886	9,143	11,527	13,088	12,187
California as percent of midspring	7.5	10.0	9.1	10.1	11.7	10.4	21.9	18.5	15.6	14.8
	percent of United States total									
Winter	2.3	3.4	2.0	2.3	1.8	4.2	6.4	5.7	4.7	6.4
Florida	2.3	3.4	2.0	2.3	1.8	4.2	6.4	5.7	4.7	6.4
Early spring	8.4	7.9	12.7	8.6	13.9	14.3	14.5	21.1	15.2	14.3
Louisiana	6.1	4.9	10.2	5.5	10.4	9.7	10.6	16.0	11.8	10.5
Others	2.3	3.0	2.5	3.1	3.5	4.6	3.9	5.1	3.4	3.8
Midspring	60.7	63.1	53.8	59.3	57.5	55.9	48.3	40.7	46.2	54.7
California	4.6	6.3	4.9	6.0	6.7	5.8	10.6	7.5	7.2	8.1
Others	56.1	56.8	48.9	53.3	50.7	50.1	37.7	33.2	39.0	46.6
Late spring	28.6	25.6	31.5	29.8	26.8	25.6	30.8	32.5	33.9	24.6
Michigan	5.3	1.6	4.1	4.5	2.8	3.5	5.8	6.8	6.0	5.3
Oregon	3.3	6.4	5.4	5.0	6.5	6.0	7.4	7.5	8.1	2.9
Others[a/]	20.0	17.6	22.0	20.3	17.4	16.1	17.6	18.2	19.8	16.4
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(Continued on next page.)

Appendix Table II continued.

	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
	thousand crates									
Winter	672	520	481	572	525	765	504	385	350	156
Florida	672	520	481	572	525	765	504	385	350	156
Early spring	1,693	1,115	1,583	1,788	1,461	1,712	1,421	1,762	1,904	829
Louisiana	1,242	771	1,243	1,443	1,100	1,270	1,035	1,356	1,538	626
Others	451	344	340	345	361	442	386	406	366	203
Midspring	5,684	5,444	3,628	4,395	4,484	4,948	4,949	5,367	6,174	2,757
California	951	840	673	837	832	754	899	762	556	294
Others	4,733	4,604	2,955	3,558	3,652	4,194	4,050	4,605	5,618	2,463
Late spring	2,411	3,732	3,313	4,054	3,503	4,983	5,752	5,016	4,673	2,819
Michigan	330	824	600	990	380	1,102	1,254	824	820	672
Oregon	416	594	916	840	930	904	1,250	1,350	1,012	412
Others[a/]	1,665	2,314	1,797	2,224	2,193	2,977	3,248	2,842	2,841	1,735
United States total	10,460	10,811	9,005	10,809	9,973	12,408	12,626	12,530	13,101	6,561
California as percent of midspring	16.7	15.4	18.6	19.0	18.6	15.2	18.2	14.2	9.0	10.7
	percent of United States total									
Winter	6.4	4.8	5.3	5.3	5.3	6.2	4.0	3.1	2.7	2.4
Florida	6.4	4.8	5.3	5.3	5.3	6.2	4.0	3.1	2.7	2.4
Early spring	16.2	10.3	17.6	16.5	14.6	13.8	11.2	14.1	14.5	12.6
Louisiana	11.9	7.1	13.8	13.3	11.0	10.2	8.2	10.8	11.7	9.5
Others	4.3	3.2	3.8	3.2	3.6	3.6	3.0	3.3	2.8	3.1
Midspring	54.3	50.4	40.3	40.7	45.0	39.9	39.2	42.8	47.1	42.0
California	9.1	7.8	7.5	7.7	8.4	6.1	7.1	6.1	4.2	4.5
Others	45.2	42.6	32.8	33.0	36.6	33.8	32.1	36.7	42.9	37.5
Late spring	23.1	34.5	36.8	37.5	35.1	40.1	45.6	40.0	35.7	43.0
Michigan	3.2	7.6	6.7	9.1	3.8	8.9	9.9	6.6	6.3	10.2
Oregon	4.0	5.5	10.2	7.8	9.3	7.3	9.9	10.8	7.7	6.3
Others[a/]	15.9	21.4	19.9	20.6	22.0	23.9	25.8	22.6	21.7	26.5
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table II continued.

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
	thousand crates					thousand pounds				
Winter	98	147	224	312	189	7,880	15,174	12,600	9,594	8,103
Florida	98	147	224	312	189	7,880	15,174	12,600	9,594	8,103
Early spring	636	936	1,282	1,065	1,058	26,183	28,160	26,714	17,812	29,664
Louisiana	522	735	1,078	890	864	21,440	23,408	21,440	13,456	25,920
Others	114	201	204	175	194	4,743	4,752	5,274	4,356	3,744
Midspring	1,726	2,057	2,757	3,883	4,552	139,913	190,282	217,098	215,553	204,876
California	180	187	390	864	1,200	50,908	81,282	88,113	114,912	152,938
Others	1,546	1,870	2,367	3,019	3,352	89,005	109,000	128,985	100,641	51,938
Late spring	2,131	2,063	2,844	3,680	4,679	137,924	160,001	149,002	173,968	184,988
Michigan	399	375	536	880	808	23,256	36,288	33,480	35,640	32,760
Washington						26,080	23,472	20,640	34,113	43,605
Oregon	450	450	750	935	1,725	40,600	42,980	32,190	55,233	62,310
Others[a/]	1,282	1,238	1,558	1,865	2,146	47,988	57,261	62,692	48,982	46,313
United States total	4,591	5,203	7,107	8,940	10,478	311,900	393,617	405,414	416,927	427,631
California as percent of midspring	10.4	9.1	14.1	22.2	26.4	36.4	42.7	40.6	53.3	74.6
	percent of United States total									
Winter	2.1	2.8	3.2	3.5	1.8	2.5	3.8	3.1	2.3	1.9
Florida	2.1	2.8	3.2	3.5	1.8	2.5	3.8	3.1	2.3	1.9
Early spring	13.9	18.0	18.0	11.9	10.1	8.4	7.2	6.6	4.3	6.9
Louisiana	11.4	14.1	15.2	10.0	8.2	6.9	6.0	5.3	3.3	6.1
Others	2.5	3.9	2.8	1.9	1.9	1.5	1.2	1.3	1.0	0.8
Midspring	37.6	39.5	38.8	43.4	43.4	44.9	48.4	53.5	51.7	47.9
California	3.9	3.6	5.5	9.7	11.4	16.3	20.7	21.7	27.6	35.8
Others	33.7	35.9	33.3	33.7	32.0	28.6	27.7	31.8	24.1	12.1
Late spring	46.4	39.7	40.0	41.2	44.7	44.2	40.6	36.8	41.7	43.3
Michigan	8.7	7.2	7.5	9.8	7.7	7.4	9.2	8.3	8.5	7.7
Washington						8.4	6.0	5.1	8.2	10.2
Oregon	9.8	8.7	10.6	10.5	16.5	13.0	10.9	7.9	13.3	14.6
Others[a/]	27.9	23.8	21.9	20.9	20.5	15.4	14.5	15.5	11.7	10.8
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table II continued.

	1954	1955	1956	1957	1958	1959	1960	1961	1962
	thousand pounds								
Winter	5,876	10,438	10,582	5,950	2,600	3,300	7,140	8,640	13,490
Florida	5,876	10,438	10,582	5,950	2,600	3,300	7,140	8,640	13,490
Early spring	36,531	14,842	26,124	18,020	18,430	18,240	18,915	20,360	22,110
Louisiana	32,643	12,070	22,680	14,440	14,070	14,300	14,490	14,960	17,160
Others	3,888	2,772	3,444	3,580	5,360	3,940	4,425	5,400	4,950
Midspring	207,256	220,359	354,788	304,067	306,460	244,550	232,855	282,340	257,420
California	159,467	166,740	243,200	223,560	210,800	170,280	156,780	204,700	207,900
Others	47,789	53,619	111,588	80,507	95,660	74,270	76,075	77,640	49,520
Late spring	161,806	201,077	156,542	222,601	203,897	211,584	207,879	198,898	222,433
Michigan	23,436	33,048	33,600	41,760	43,200	34,200	36,480	33,480	38,950
Washington	43,605	39,270	9,625	42,400	40,500	46,200	44,850	46,920	47,450
Oregon	59,128	83,475	70,728	91,500	68,640	88,920	73,500	67,680	85,250
Others	35,637	45,284	42,589	46,941	51,557	42,264	53,049	50,818	50,783
United States total	411,469	446,716	548,036	550,638	531,387	477,674	466,789	510,238	515,453
California as percent of midspring	76.9	75.7	68.5	73.5	68.8	69.6	67.3	72.5	80.8
	percent of United States total								
Winter	1.4	2.3	1.9	1.1	0.5	0.7	1.5	1.7	2.6
Florida	1.4	2.3	1.9	1.1	0.5	0.7	1.5	1.7	2.6
Early spring	8.9	3.3	4.8	3.3	3.5	3.8	4.1	4.0	4.3
Louisiana	8.0	2.7	4.1	2.6	2.6	3.0	3.1	2.9	3.3
Others	0.9	0.6	0.6	0.7	1.0	0.8	0.9	1.1	1.0
Midspring	50.4	49.3	64.7	55.2	57.7	51.1	49.9	55.3	49.9
California	38.8	37.3	44.4	40.6	39.7	35.6	33.6	40.1	40.3
Others	11.6	12.0	20.4	14.6	18.0	15.5	16.3	15.2	9.6
Late spring	39.3	45.0	28.6	40.4	38.4	44.3	44.5	39.0	43.2
Michigan	5.6	7.4	6.1	7.6	8.1	7.2	7.8	6.6	7.6
Washington	10.6	8.8	1.8	7.7	7.6	9.7	9.6	9.2	9.2
Oregon	14.4	18.7	12.9	16.6	12.9	18.6	15.7	13.3	16.5
Others	8.7	10.1	7.8	8.5	9.7	8.8	11.4	10.0	9.9
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Includes Washington through 1948.

APPENDIX TABLE III

Strawberry Production for Fresh Market: United States, Selected States, and Seasonal Groups, 1939-1962

	1939	1940	1941	1942	1943	1944	1945	1946
	thousand crates							
Winter	765	504	385	350	156	78	121	169
Florida	765	504	385	350	156	78	121	169
Early spring	1,599	1,358	1,405	1,483	684	448	712	833
Louisiana	1,157	972	999	1,117	481	334	511	629
Others	442	386	406	366	203	114	201	204
Midspring	4,834	4,756	5,243	5,621	2,688	1,657	1,973	2,577
California	754	899	762	556	276	155	163	293
Others	4,080	3,857	4,481	5,065	2,412	1,502	1,810	2,284
Late spring	3,792	4,093	3,136	3,270	2,375	1,608	1,376	1,771
Michigan	1,102	1,254	824	820	672	399	375	536
Others[a]	2,690	2,839	2,312	2,450	1,703	1,209	1,001	1,235
United States total	10,990	10,711	10,169	10,724	5,903	3,791	4,182	5,350
California as percent of midspring	15.6	18.9	14.5	9.9	10.3	9.4	8.3	11.4
	percent of United States total							
Winter	7.0	4.7	3.8	3.3	2.7	2.1	2.9	3.1
Florida	7.0	4.7	3.8	3.3	2.7	2.1	2.9	3.1
Early spring	14.5	12.7	13.8	13.8	11.6	11.8	17.0	15.6
Louisiana	10.5	9.1	9.8	10.4	8.1	8.8	12.2	11.8
Others	4.0	3.6	4.0	3.4	3.4	3.0	4.8	3.8
Midspring	44.0	44.4	51.6	52.4	45.5	43.7	47.2	48.2
California	6.9	8.4	7.5	5.2	4.7	4.1	3.9	5.5
Others	37.1	36.0	44.1	47.2	40.8	39.6	43.3	42.7
Late spring	34.5	38.2	30.8	30.5	40.2	42.4	32.9	33.1
Michigan	10.0	11.7	8.1	7.6	11.4	10.5	9.0	10.0
Others[a]	24.5	26.5	22.7	22.9	28.8	31.9	23.9	23.1
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table III continued.

	1947	1948	1949	1950	1951	1952	1953	1954
	thousand crates		thousand pounds					
Winter	271	168	7,640	13,374	10,860	8,334	6,483	5,096
Florida	271	168	7,640	13,374	10,860	8,334	6,483	5,096
Early spring	831	763	21,117	16,158	17,068	15,670	27,290	24,409
Louisiana	656	569	17,870	13,208	14,650	11,358	23,914	20,851
Others	175	194	3,247	2,950	2,418	3,812	3,384	3,525
Midspring	3,244	3,297	114,768	113,222	138,648	126,115	107,427	102,226
California	659	879	43,122	47,724	54,317	68,162	71,712	71,577
Others	2,585	2,418	71,646	65,498	84,331	57,953	35,715	30,649
Late spring	2,292	2,053	75,232	80,203	91,712	78,598	73,468	52,671
Michigan	880	593	19,958	16,704	22,872	22,380	18,990	14,256
Washington			4,694	4,262	4,456	5,111	5,593	5,219
Oregon			2,592	1,976	1,692	2,125	2,572	2,926
Others[a]	1,412	1,460	47,988	57,261	62,692	48,982	46,313	30,270
United States total	6,636	6,281	218,757	222,957	258,288	228,717	214,676	184,402
California as percent of midspring	20.3	26.7	37.6	42.2	39.2	54.0	66.8	70.0
			percent of United States total					
Winter	4.1	2.7	3.5	6.0	4.2	3.6	3.0	2.8
Florida	4.1	2.7	3.5	6.0	4.2	3.6	3.0	2.8
Early spring	12.5	12.1	9.7	7.2	6.6	6.9	12.7	13.2
Louisiana	9.9	9.0	8.2	5.9	5.7	5.2	11.1	11.3
Others	2.6	3.1	1.5	1.3	0.9	1.7	1.6	1.9
Midspring	48.9	52.5	52.5	50.8	53.7	55.1	50.1	55.4
California	9.9	14.0	19.7	21.4	21.0	29.8	33.4	38.8
Others	39.0	38.5	32.8	29.4	32.7	25.3	16.7	16.6
Late spring	34.5	32.7	34.3	36.0	35.5	34.4	34.2	28.6
Michigan	13.2	9.4	9.1	7.5	8.9	9.8	8.8	7.7
Washington			2.1	1.9	1.7	2.3	2.6	2.8
Oregon			1.2	0.9	0.6	0.9	1.2	1.6
Others[a]	21.3	23.3	21.9	25.7	24.3	21.4	21.6	16.4
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table III continued.

	1955	1956	1957	1958	1959	1960	1961	1962
	thousand pounds							
Winter	7,498	7,282	5,422	2,097	3,133	6,538	7,756	13,451
Florida	7,498	7,282	5,422	2,097	3,133	6,538	7,756	13,451
Early spring	12,020	22,190	16,620	17,360	16,581	18,407	19,065	20,043
Louisiana	9,384	18,940	13,240	13,250	12,841	13,982	13,665	15,093
Others	2,636	3,250	3,380	4,110	3,740	4,425	5,400	4,950
Midspring	98,642	151,571	170,354	152,980	144,825	132,785	160,650	171,360
California	64,400	88,500	118,260	97,800	96,280	85,780	122,500	135,300
Others	34,242	63,071	52,094	55,180	48,545	47,005	48,150	36,060
Late spring	69,263	60,025	83,901	92,257	71,734	80,179	81,218	84,233
Michigan	21,998	18,200	30,760	35,740	23,900	23,980	25,780	28,050
Washington	4,692	1,100	4,400	4,500	3,400	3,100	2,220	2,800
Oregon	2,759	2,728	5,200	2,840	3,820	3,150	4,200	4,400
Others	39,814	37,997	43,541	49,177	40,614	49,949	49,018	48,983
United States total	187,423	241,068	276,297	264,694	236,273	237,909	288,689	289,087
California as percent of midspring	65.3	58.4	69.4	63.9	66.5	64.6	73.3	79.0
	percent of United States total							
Winter	4.0	3.0	2.0	0.8	1.3	2.7	2.7	4.7
Florida	4.0	3.0	2.0	0.8	1.3	2.7	2.7	4.7
Early spring	6.4	9.2	6.0	6.6	7.0	7.7	6.6	6.9
Louisiana	5.0	7.9	4.8	5.0	5.4	5.9	4.7	5.2
Others	1.4	1.3	1.2	1.6	1.6	1.9	1.9	1.7
Midspring	52.6	62.9	61.7	57.8	61.3	55.8	62.6	59.3
California	34.4	36.7	42.8	36.9	40.7	36.1	45.9	46.8
Others	18.3	26.2	18.9	20.8	20.5	19.8	16.7	12.5
Late spring	37.0	24.9	30.4	34.9	30.4	33.7	28.1	29.1
Michigan	11.7	7.5	11.1	13.5	10.1	10.1	8.9	9.7
Washington	2.5	0.5	1.6	1.7	1.4	1.3	0.8	1.0
Oregon	1.5	1.1	1.9	1.1	1.6	1.3	1.5	1.5
Others	21.2	15.8	15.8	18.6	17.2	21.0	17.0	16.9
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Includes Washington and Oregon through 1948.

APPENDIX TABLE IV

Strawberry Production for Processing: United States, Selected States, and Seasonal Groups, 1939-1962

	1939	1940	1941	1942	1943	1944	1945	1946
	thousand crates							
Winter	a/					20	26	55
Florida						20	26	55
Early spring	113	63	204	421	145	188	224	449
Louisiana	113	63	204	421	145	188	224	449
Others								
Midspring	114	133	64	58	69	69	84	180
California					18	25	24	97
Others	114	133	64	58	51	44	60	83
Late spring	1,191	1,609	1,880	1,167	424	514	677	1,073
Washington	397	550	705	373	139	176	324	382
Oregon	794	1,059	1,175	794	285	338	353	691
Others b/								
United States total	1,418	1,805	2,148	1,646	638	791	1,011	1,757
California as percent of midspring					26.1	36.2	28.6	53.9
	percent of United States total							
Winter						2.5	2.6	3.1
Florida						2.5	2.6	3.1
Early spring	8.0	3.5	9.5	25.6	22.7	23.8	22.1	25.6
Louisiana	8.0	3.5	9.5	25.6	22.7	23.8	22.1	25.6
Others								
Midspring	8.0	7.4	3.0	3.5	10.8	8.7	8.3	10.2
California					2.8	3.2	2.4	5.5
Others	8.0	7.4	3.0	3.5	8.0	5.5	5.9	4.7
Late spring	84.0	89.1	87.5	70.9	66.5	65.0	67.0	61.1
Washington	28.0	30.5	32.8	22.7	21.8	22.2	32.0	21.7
Oregon	56.0	58.6	54.7	48.2	44.7	42.8	35.0	39.4
Others b/								
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table IV continued.

	1947	1948	1949	1950	1951	1952	1953	1954
	thousand crates		thousand pounds					
Winter	41	21	240	1,800	1,740	1,260	1,620	780
Florida	41	21	240	1,800	1,740	1,260	1,620	780
Early spring	234	295	5,066	12,002	6,766	2,142	2,366	7,874
Louisiana	234	295	3,570	10,200	3,910	1,598	2,006	7,514
Others			1,496	1,802	2,856	544	360	360
Midspring	639	1,255	25,145	77,060	78,450	89,438	97,449	105,030
California	205	321	7,786	33,558	33,796	46,750	81,226	87,890
Others	434	934	17,359	43,502	44,654	42,688	16,223	17,140
Late spring	1,338	2,586	61,676	79,798	57,290	95,370	111,520	109,135
Michigan			3,298	19,584	10,608	13,260	13,770	9,180
Washington	529	753	21,386	19,210	16,184	29,002	38,012	38,386
Oregon[b]	809	1,618	36,992	41,004	30,498	53,108	59,738	56,202
Others[b]		215						5,367
United States total	2,252	4,157	92,127	170,660	144,246	188,210	212,955	222,819
California as percent of midspring	32.1	25.6	31.0	43.5	43.1	52.3	83.4	83.7
	percent of United States total							
Winter	1.8	0.5	0.3	1.1	1.2	0.7	0.8	0.4
Florida	1.8	0.5	0.3	1.1	1.2	0.7	0.8	0.4
Early spring	10.4	7.1	5.5	7.0	4.7	1.1	1.1	3.5
Louisiana	10.4	7.1	3.9	6.0	2.7	0.8	0.9	3.4
Others			1.6	1.0	2.0	0.3	0.2	0.2
Midspring	28.4	30.2	27.3	45.1	54.4	47.5	45.7	47.1
California	9.1	7.7	8.5	19.6	23.4	24.8	38.1	39.4
Others	19.3	22.5	18.8	25.5	31.0	22.7	7.6	7.7
Late spring	59.4	62.2	66.9	46.8	39.7	50.7	52.4	49.0
Michigan			3.6	11.5	7.4	7.1	6.5	4.1
Washington	23.5	18.1	23.2	11.3	11.2	15.4	17.8	17.2
Oregon[b]	35.9	38.9	40.1	24.0	21.1	28.2	28.1	25.2
Others[b]		5.2						2.4
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table IV continued.

	1955	1956	1957	1958	1959	1960	1961	1962
	thousand pounds							
Winter	2,940	3,300	528	503	167	602	884	39
Florida	2,940	3,300	528	503	167	602	884	39
Early spring	2,822	3,934	400	1,070	1,659	508	1,295	2,067
Louisiana	2,686	3,740	200	820	1,459	508	1,295	2,067
Others	136	194	200	250	200			
Midspring	121,717	203,217	128,230	152,780	99,225	100,070	101,690	86,060
California	102,340	154,700	105,300	113,000	74,000	71,000	72,200	72,600
Others	19,377	48,517	22,930	39,780	25,225	29,070	29,490	13,460
Late spring	131,814	96,517	138,700	111,640	139,850	127,700	117,680	138,200
Michigan	11,050	15,400	11,000	7,460	10,300	12,500	7,700	10,900
Washington	34,578	8,525	38,000	36,000	42,800	41,750	44,700	44,650
Oregon	80,716	68,000	86,300	65,800	85,100	70,350	63,480	80,850
Others	5,470	4,592	3,400	2,380	1,650	3,100	1,800	1,800
United States total	259,293	306,963	267,858	265,993	240,901	228,880	221,549	226,366
California as percent of midspring	84.1	76.1	82.1	74.0	74.6	71.0	71.0	84.4
	percent of United States total							
Winter	1.1	1.1	0.2	0.2	0.1	0.3	0.4	0.02
Florida	1.1	1.1	0.2	0.2	0.1	0.3	0.4	0.02
Early spring	1.1	1.3	0.1	0.4	0.7	0.2	0.6	0.9
Louisiana	1.0	1.2	0.1	0.3	0.6	0.2	0.6	0.9
Others	0.1	0.1	0.1	0.1	0.1			
Midspring	46.9	66.2	47.9	57.4	41.2	43.7	45.9	38.0
California	39.5	50.4	39.3	42.5	30.7	31.0	32.6	32.1
Others	7.5	15.8	8.6	15.0	10.5	12.7	13.3	5.9
Late spring	50.8	31.4	51.8	42.0	58.1	55.8	53.1	61.1
Michigan	4.3	5.0	4.1	2.8	4.3	5.5	3.5	4.8
Washington	13.3	2.8	14.2	13.5	17.8	18.2	20.2	19.7
Oregon	31.1	22.2	32.2	24.7	35.3	30.7	28.7	35.7
Others	2.1	1.5	1.3	0.9	0.7	1.4	0.8	0.8
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Blanks indicate no data available.
b/ Includes Michigan through 1948.

APPENDIX TABLE V

Strawberry Production, Yield Per Acre for All Uses: United States, Selected States, and Seasonal Groups 1924-1962

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933
	crates									
Winter	60	71	67	78	51	87	67	72	79	73
Florida	60	71	67	78	51	87	67	72	79	73
Early spring[a]	52	48	55	41	61	56	43	93	66	66
Louisiana	51	42	56	33	58	52	44	90	67	68
Others[a]	56	61	59	72	70	67	41	103	63	63
Midspring[a]	70	66	65	65	59	61	50	67	63	61
California	150	166	151	165	204	182	220	195	210	210
Others[a]	67	62	61	61	54	56	41	58	56	54
Late spring[a]	76	54	74	80	72	67	56	74	78	59
Michigan	83	21	64	83	61	65	65	95	75	60
Oregon	67	92	73	71	78	66	60	70	80	48
Others[a/b]	77	54	76	82	73	68	53	70	77	62
United States[a]	69	61	66	65	62	62	51	74	69	62
California as percent of midspring	214.3	251.5	232.3	253.8	345.8	298.4	440.0	291.0	333.3	344.3
	percent of United States total									
Winter	87.0	116.4	101.5	120.0	82.3	140.3	131.4	97.3	114.5	117.7
Florida	87.0	116.4	101.5	120.0	82.3	140.3	131.4	97.3	114.5	117.7
Early spring[a]	75.4	78.7	83.3	63.1	98.4	90.3	84.3	125.7	95.6	106.5
Louisiana	73.9	68.9	84.8	50.8	93.5	83.9	86.3	121.6	97.1	109.7
Others[a]	81.2	100.0	89.4	110.8	112.9	108.1	80.4	139.2	91.3	101.6
Midspring[a]	101.4	108.2	98.5	100.0	95.2	98.4	98.0	90.5	91.3	98.4
California	217.4	272.1	228.8	253.8	329.0	293.5	431.4	263.5	304.3	338.7
Others[a]	97.1	101.6	92.4	93.8	87.1	90.3	80.4	78.4	81.2	87.1
Late spring[a]	110.1	88.5	112.1	123.1	116.1	108.1	109.8	100.0	113.0	95.2
Michigan	120.3	34.4	97.0	127.7	98.4	104.8	127.4	128.4	108.7	96.8
Oregon	97.1	150.8	110.6	109.2	125.8	106.5	117.6	94.6	115.9	77.4
Others[a/b]	111.6	88.5	115.1	126.1	117.7	109.7	103.9	94.6	111.6	100.0
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table V continued.

	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
	crates									
Winter	80	65	54	65	70	85	70	70	70	60
Florida	80	65	54	65	70	85	70	70	70	60
Early spring[a]	64	45	80	79	54	59	54	61	75	49
Louisiana	64	41	84	82	50	55	50	60	75	45
Others[a]	63	56	67	68	69	72	67	64	75	65
Midspring[a]	52	70	47	70	65	64	70	70	83	53
California	198	175	143	180	165	145	155	125	105	155
Others[a]	45	63	41	61	57	58	62	65	81	49
Late spring[a]	46	77	67	83	68	84	93	85	92	74
Michigan	30	80	60	110	40	105	110	80	100	105
Oregon[a/b]	40	60	84	75	75	80	100	100	85	55
Others[a/b]	54	81	64	77	74	79	85	80	92	72
United States[a]	53	68	58	75	64	71	76	73	84	60
California as percent of midspring	380.8	250.0	304.3	257.1	253.8	226.6	221.4	178.6	126.5	292.4
	percent of United States total									
Winter	150.9	95.6	93.1	86.7	109.4	119.7	92.1	95.9	83.3	100.0
Florida	150.9	95.6	93.1	86.7	109.4	119.7	92.1	95.9	83.3	100.0
Early spring[a]	120.7	66.2	137.9	105.3	84.4	83.1	71.0	83.6	89.3	81.7
Louisiana	120.7	60.3	144.8	109.3	78.1	77.5	65.8	82.2	89.3	75.0
Others[a]	118.8	82.3	115.5	90.7	107.8	101.4	88.2	87.7	89.3	108.3
Midspring[a]	98.1	102.9	81.0	93.3	101.6	90.1	92.1	95.9	98.8	88.3
California	373.6	257.3	246.5	240.0	257.8	204.2	203.9	171.2	125.0	258.3
Others[a]	84.9	92.6	70.7	81.3	89.1	81.7	81.6	89.0	96.4	81.7
Late spring[a]	86.8	113.2	115.5	110.7	106.3	118.3	122.4	116.4	109.5	123.3
Michigan	56.6	117.6	103.4	146.7	62.5	147.9	144.7	109.6	119.0	175.0
Oregon[a/b]	75.5	88.2	144.8	100.0	117.2	112.7	131.6	137.0	101.2	91.7
Others[a/b]	101.9	119.1	110.3	102.7	115.6	111.3	111.8	109.6	109.5	120.0
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table V continued.

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
			crates					pounds		
Winter	70	70	80	65	45	1,970	2,810	2,100	2,460	2,130
Florida	70	70	80	65	45	1,970	2,810	2,100	2,460	2,130
Early spring[a]	54	73	72	52	60	1,642	1,782	1,702	2,313	3,058
Louisiana	55	70	70	50	60	1,600	1,760	1,600	2,320	3,200
Others[a]	49	84	82	64	61	1,860	1,901	2,293	2,293	2,340
Midspring[a]	52	66	76	85	93	2,832	3,348	3,247	3,554	5,335
California	150	170	205	270	300	11,570	14,260	12,770	13,680	16,270
Others[a]	49	62	69	71	75	1,978	2,132	2,151	1,913	1,791
Late spring[a]	70	70	86	89	101	2,947	3,333	2,948	3,428	3,870
Michigan	70	75	80	110	95	3,060	4,320	3,600	3,600	3,600
Washington						3,260	3,260	2,580	4,110	5,130
Oregon	85	75	100	85	115	2,900	3,070	2,220	3,610	4,020
Others[a/b]	65	68	82	83	95	2,790	3,112	3,344	2,840	3,151
United States[a]	60	69	79	80	90	2,685	3,123	2,914	3,380	4,293
California as percent of midspring	288.5	257.6	269.7	317.6	322.6	408.5	425.9	393.3	387.1	305.0
						percent of United States total				
Winter	116.7	101.4	101.3	81.2	50.0	73.4	90.0	72.1	72.8	51.0
Florida	116.7	101.4	101.3	81.2	50.0	73.4	90.0	72.1	72.8	51.0
Early spring[a]	90.0	105.8	91.1	65.0	66.7	61.2	57.1	58.4	68.4	71.2
Louisiana	91.7	101.4	88.6	62.5	66.7	59.6	56.4	54.9	68.6	74.5
Others[a]	81.7	121.7	103.8	80.0	67.8	69.3	60.9	78.7	67.8	54.5
Midspring[a]	86.7	95.6	96.2	106.2	103.3	105.5	107.2	111.4	104.6	124.3
California	250.0	246.4	259.5	337.5	333.3	430.9	456.6	438.2	404.7	379.0
Others[a]	81.7	89.9	87.3	88.8	83.3	73.7	68.3	73.8	56.6	41.7
Late spring[a]	116.7	101.4	108.9	111.2	112.2	109.8	106.7	101.2	101.4	90.1
Michigan	116.7	108.7	101.3	137.5	105.6	114.0	138.3	123.5	106.5	83.9
Washington						121.4	104.4	88.5	121.6	119.5
Oregon	141.7	108.7	126.6	106.2	127.8	108.0	98.3	76.2	106.8	93.6
Others[a/b]	108.3	98.5	103.8	103.8	105.6	103.9	99.6	114.8	84.0	73.4
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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Appendix Table V continued.

	1954	1955	1956	1957	1958	1959	1960	1961	1962
					pounds				
Winter	2,260	3,070	2,860	1,700	1,300	2,200	5,100	4,800	7,100
Florida	2,260	3,070	2,860	1,700	1,300	2,200	5,100	4,800	7,100
Early spring[a]	3,350	1,750	2,670	1,970	2,180	2,250	2,162	2,367	2,303
Louisiana	3,510	1,700	2,700	1,900	2,100	2,200	2,100	2,200	2,200
Others[a]	2,430	1,980	2,460	2,310	3,063	2,462	2,682	3,000	2,750
Midspring[a]	5,720	5,690	6,400	5,300	6,030	5,980	6,064	7,590	7,062
California	14,630	11,910	12,800	10,800	12,400	12,900	13,400	17,800	19,800
Others[a]	1,885	2,170	3,063	2,194	2,830	2,681	2,756	3,021	1,908
Late spring[a]	3,480	4,030	3,420	4,270	4,250	4,590	4,536	4,488	4,731
Michigan	2,520	3,240	3,000	3,600	4,000	3,600	3,800	3,600	4,100
Washington	5,130	4,620	2,750	5,300	5,400	6,600	6,500	6,900	6,500
Oregon	3,890	4,770	4,210	5,000	4,400	5,700	4,900	4,800	5,500
Others[a]	2,650	3,310	2,982	3,301	3,662	2,985	3,541	3,599	3,450
United States[a]	4,280	4,450	4,780	4,510	4,860	4,950	4,946	5,551	5,428
California as percent of midspring	255.8	209.3	200.0	203.8	205.6	215.7	221.0	234.5	280.4
					percent of United States total				
Winter	52.8	69.0	59.8	37.7	26.7	44.4	103.1	86.5	130.8
Florida	52.8	69.0	59.8	37.7	26.7	44.4	103.1	86.5	130.8
Early spring[a]	78.3	39.3	55.9	43.7	44.9	45.5	43.7	42.6	42.4
Louisiana	82.0	38.2	56.5	42.1	43.2	44.4	42.5	39.6	40.5
Others[a]	56.8	44.5	51.5	51.2	63.0	49.7	54.2	54.0	50.7
Midspring[a]	133.6	127.9	133.9	117.5	124.1	120.8	122.6	136.7	130.1
California	341.8	267.6	267.8	239.5	255.1	260.6	270.9	320.7	364.8
Others[a]	44.0	48.8	64.1	48.6	58.2	54.2	55.7	54.4	35.2
Late spring[a]	81.3	90.6	71.5	94.7	87.4	92.7	91.7	80.9	87.2
Michigan	58.9	72.8	62.8	79.8	82.3	72.7	76.8	64.9	75.5
Washington	119.9	103.8	57.5	117.5	111.1	133.3	131.4	124.3	119.7
Oregon	90.9	107.2	88.1	110.9	90.5	115.2	99.1	86.5	101.3
Others[a]	61.9	74.4	62.4	73.2	75.3	60.3	71.6	64.8	63.6
United States total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Group average.
b/ Includes Washington through 1948.

APPENDIX TABLE VI

Strawberry Production: Season Average Price Per Crate Received by Growers for All Uses
United States, California, and Seasonal Groups, 1924-1948

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
	dollars per crate												
Winter	6.50	6.25	8.40	6.95	8.40	5.30	6.70	5.75	4.80	3.00	4.20	4.30	4.10
Early spring[a]	5.62	5.20	6.30	4.77	5.52	3.80	4.64	4.05	2.41	2.28	2.61	3.26	3.38
Midspring[a]	3.06	3.86	3.81	3.40	2.55	2.76	3.46	2.90	1.70	1.41	1.58	2.17	2.61
California	3.97	5.15	4.66	5.52	3.83	4.12	3.83	3.62	2.35	2.44	2.20	2.47	2.69
Late spring[a]	3.10	4.37	3.55	3.37	2.98	3.15	3.91	2.48	1.49	1.65	2.04	2.01	2.52
United States[a]	3.37	4.18	4.13	3.59	3.19	3.12	3.98	3.17	1.93	1.74	2.04	2.33	2.79

	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	
Winter	4.80	4.00	4.15	4.65	5.70	6.50	9.60	11.30	10.76	10.54	11.57	10.60	
Early spring[a]	3.14	3.00	3.00	3.43	2.81	4.02	6.87	9.48	9.68	10.13	8.57	9.73	
Midspring[a]	2.62	2.57	2.41	2.66	2.18	2.62	6.16	7.73	8.42	8.88	7.14	7.83	
California	2.93	2.91	3.40	3.40	3.20	4.80	10.65	9.95	9.45	11.70	10.19	8.98	
Late spring[a]	3.00	2.50	2.02	1.87	2.42	3.25	6.20	7.43	8.09	10.23	7.32	7.68	
United States[a]	2.96	2.72	2.44	2.47	2.47	3.17	6.35	7.91	8.58	9.70	7.54	8.01	

a/ Group average.

APPENDIX TABLE VII

Strawberry Production: Season Average Price Per Pound Received by Growers for All Uses
United States, Selected States, and Seasonal Groups, 1949-1962

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	cents per pound													
Winter	31.10	25.60	28.40	28.30	27.10	32.7	27.7	27.4	29.5	26.0	41.5	38.2	32.5	35.1
Florida	31.10	25.60	28.40	28.30	27.10	32.7	27.7	27.4	29.5	26.0	41.5	38.2	32.5	35.1
Early spring[a/]	27.64	26.28	22.75	28.38	27.01	20.8	30.3	27.7	31.0	27.5	26.5	28.6	28.1	28.1
Louisiana	29.80	27.30	24.60	30.40	27.70	21.1	31.8	28.5	32.8	29.0	26.8	29.5	30.2	28.5
Midspring[a/]	19.24	19.79	17.74	18.36	18.42	19.5	20.4	16.9	14.5	15.6	18.5	19.4	17.5	17.6
California	18.40	20.00	20.80	18.40	17.80	19.0	20.2	16.9	14.4	15.6	19.1	20.1	17.6	17.6
Late spring[a/]	18.71	20.88	18.08	17.34	18.72	18.5	18.4	17.6	12.1	15.3	16.1	17.3	15.6	16.2
Michigan	21.10	18.80	17.50	16.50	19.00	21.9	21.4	16.6	14.6	16.4	16.7	18.2	17.1	17.7
Washington	15.00	23.90	17.20	16.00	16.60	16.0	16.7	16.3	8.5	12.4	14.1	14.9	12.3	13.7
Oregon	14.80	22.40	17.20	15.40	16.60	15.0	15.7	15.5	8.4	12.5	13.6	14.2	12.3	13.0
United States[a/]	20.02	20.92	18.49	18.59	19.32	19.4	20.0	17.8	14.2	16.0	17.9	19.1	17.4	17.9

a/ Group average.

APPENDIX TABLE VIII

Strawberry Production: Season Average Price Per Crate Received by Growers for Fresh Market United States, California, and Seasonal Groups, 1939-1948[a/]

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
	dollars per crate									
Winter	4.15	4.65	5.70	6.50	9.60	12.65	11.70	12.35	12.90	11.65
Early spring[b/]	3.10	3.51	3.00	4.39	7.26	10.30	9.92	10.69	8.90	10.43
Midspring[b/]	2.42	2.69	2.19	2.63	6.17	7.75	8.41	8.83	7.34	8.26
California	3.40	3.40	3.20	4.80	10.80	10.20	9.60	12.20	11.00	10.00
Late spring[b/]	2.09	2.00	2.79	3.37	6.53	7.98	9.16	10.82	7.99	8.77
United States[b/]	2.53	2.62	2.62	3.22	6.53	8.25	9.01	9.89	7.98	8.78

a/ Includes price for processing in states where processing crop is not estimated separately.

b/ Group average.

APPENDIX TABLE IX

Strawberry Production: Season Average Price Per Pound Received by Growers for Fresh Market
United States, Selected States, and Seasonal Groups, 1949-1962

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	cents per pound													
Winter	31.90	27.10	29.70	30.10	28.90	35.0	31.4	31.9	31.2	28.9	43.0	40.3	34.6	35.2
Florida	31.90	27.10	29.70	30.10	28.90	35.0	31.4	31.9	31.2	28.9	43.0	40.3	34.6	35.2
Early spring[a/]	30.70	29.13	25.75	29.85	27.91	22.5	32.9	29.9	31.4	28.3	27.8	29.0	29.1	29.7
Louisiana	32.50	31.00	26.50	31.90	28.60	23.1	35.3	31.1	33.1	30.0	28.5	30.1	31.2	30.8
Midspring[a/]	19.69	19.75	18.19	19.63	20.19	22.9	24.2	20.6	17.7	19.3	21.8	22.8	20.9	20.6
California	18.70	20.00	21.30	20.00	19.30	22.6	25.2	22.1	17.9	20.1	23.0	24.1	21.3	20.8
Late spring[a/]	22.30	20.26	18.93	19.92	22.04	24.7	22.9	21.4	18.4	19.4	21.1	21.7	20.6	21.3
Michigan	22.20	19.60	17.80	17.50	19.40	22.8	22.5	18.1	16.0	17.2	17.0	19.0	15.8	19.2
Washington	16.50	24.70	21.40	20.60	21.10	19.2	20.3	20.4	13.0	16.0	18.5	21.7	16.8	22.8
Oregon	23.90	28.00	18.10	16.10	19.40	21.7	20.0	18.2	12.7	25.1	26.2	17.6	15.1	15.2
United States[a/]	22.08	21.05	19.43	20.81	22.07	23.7	24.6	22.0	19.0	20.0	22.3	23.4	21.6	22.1

a/ Group average.

APPENDIX TABLE X

Strawberry Production: Season Average Price Per Crate Received by Growers for Processing United States, California, and Seasonal Groups, 1939-1948

	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948
	dollars per crate									
Winter	a/					6.00	6.40	5.00	2.75	2.20
Early spring b/	1.70	1.70	1.55	2.70	5.00	7.50	8.90	9.10	7.40	7.90
Midspring b/	1.95	1.60	1.75	1.75	5.81	7.38	8.69	9.66	6.10	6.71
California					6.40	8.40	8.40	10.20	7.60	8.20
Late spring	1.78	1.55	1.82	2.95	4.33	5.71	5.90	9.26	6.17	6.91
United States b/	1.79	1.56	1.79	2.84	4.65	6.29	6.81	9.13	6.21	6.89

a/ Blanks indicate no data available.

b/ Group average.

APPENDIX TABLE XI

Strawberry Production: Season Average Price Per Pound Received by Growers for Processing United States, Selected States, and Seasonal Groups, 1949-1962

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
	cents per pound													
Winter	6.70	14.50	20.20	16.00	20.00	17.7	18.3	17.4	12.4	13.7	14.0	15.4	14.5	12.5
Florida	6.70	14.50	20.20	16.00	20.00	17.7	18.3	17.4	12.4	13.7	14.0	15.4	14.5	12.5
Early spring[a/]	14.68	22.45	15.19	17.60	16.61	15.5	19.4	15.5	15.8	14.6	13.0	12.0	12.0	12.0
Louisiana	16.00	22.60	17.40	19.00	17.10	15.6	19.4	15.3	10.0	13.2	11.9	12.0	12.0	12.0
Midspring[a/]	17.20	19.34	16.94	16.55	16.47	16.2	17.3	14.2	10.3	11.9	13.6	14.9	11.5	11.7
California	17.00	20.00	20.00	16.00	16.50	16.0	17.0	14.0	10.4	11.7	14.0	15.3	10.7	10.7
Late spring[a/]	14.32	21.50	16.73	15.21	16.54	15.5	16.1	15.2	8.5	12.0	13.5	14.5	12.1	13.0
Michigan	14.40	18.10	16.80	14.90	18.50	20.6	19.1	14.8	10.5	12.5	16.0	16.7	12.5	14.0
Washington	14.70	23.70	16.00	15.20	15.90	15.6	16.2	15.6	8.0	12.0	13.7	14.4	12.1	13.1
Oregon	14.10	22.10	17.10	15.30	16.50	14.7	15.6	15.4	8.1	12.0	13.0	14.1	12.1	12.9
United States[a/]	15.12	20.74	16.81	15.88	16.54	15.8	16.7	14.5	9.3	12.0	13.6	14.7	11.9	13.0

a/ Group average.

APPENDIX TABLE XII

Frozen Strawberry Pack: United States, California, and Regional Groups, 1942-1962[a/]

Year	California	Column 1 as percent of column 11	Other West	Column 3 as percent of column 11	Midwest	Column 5 as percent of column 11	South	Column 7 as percent of column 11	Northeast	Column 9 as percent of column 11	United States	Total California and other West	Column 12 as percent of column 11
	1	2	3	4	5	6	7	8	9	10	11	12	13
	thousand pounds[b/]		thousand pounds[b/]		thousand pounds[b/]		thousand pounds[b/]		thousand pounds[b/]		thousand pounds[b/]		
1942	5,901	9.2	35,560	55.8	1,715	2.7	18,087	28.4	2,512	3.9	63,776	41,461	65.0
1943	725	2.4	13,463	45.1	679	2.3	11,109	37.2	3,750	12.9	29,729	14,191	47.6
1944	1,005	2.9	18,135	52.1	1,792	5.1	11,227	32.2	2,666	7.7	34,825	19,140	55.0
1945	970	2.6	19,057	51.6	1,869	5.1	13,770	37.3	1,251	3.4	36,917	20,027	54.2
1946	3,318	5.0	33,337	43.5	5,832	7.5	24,921	31.9	9,454	12.1	78,059	37,653	48.5
1947	8,336	7.5	54,521	50.1	9,699	8.9	25,861	23.7	10,548	9.7	109,036	62,827	57.7
1948	12,378	8.1	89,681	56.0	9,264	5.8	39,007	24.4	9,147	5.7	160,077	102,059	64.1
1949	9,265	8.6	63,806	53.9	5,634	4.7	21,114	19.6	3,364	3.1	107,603	73,071	72.6
1950	39,359	20.6	69,219	35.7	18,574	9.6	54,834	28.3	11,185	5.8	193,771	109,178	56.3
1951	40,237	25.5	51,990	32.9	15,583	9.9	42,456	26.9	7,677	4.9	157,942	92,227	58.4
1952	58,596	28.4	94,174	45.6	11,273	5.5	34,814	16.8	7,773	3.8	206,635	152,770	73.9
1953	93,682	41.2	100,060	44.0	13,102	5.8	14,004	6.2	6,758	3.0	227,605	193,742	85.1
1954	96,474	42.5	99,609	43.9	9,102	4.0	16,538	7.3	5,412	2.4	227,135	196,083	86.3
1955	119,505	43.3	120,212	43.5	15,319	5.5	15,157	5.5	5,986	2.2	276,180	239,717	86.8
1956	173,199	55.5	81,951	26.2	15,895	5.1	37,029	11.9	4,219	1.4	312,293	255,150	81.7
1957	118,305	45.3	112,787	43.2	14,511	5.6	13,463	5.2	1,796	0.7	260,864	231,092	88.6
1958	133,470	49.5	95,462	35.4	9,425	3.5	28,281	10.5	3,009	1.1	269,647	228,932	84.9
1959	82,939	33.4	127,797	51.5	17,169	6.9	17,053	6.9	3,294	1.3	248,253	210,710	84.9
1960	79,710	34.4	115,471	49.9	12,674	5.5	21,584	9.3	2,320	0.9	231,759	195,181	84.2
1961	81,140	36.4	106,868	48.0	9,107	4.1	24,260	10.9	1,138	0.5	222,694	188,008	84.4
1962	85,285	36.4	127,845	54.5	11,399	4.9	9,822	4.2	269	0.1	234,620	213,131	90.8

a/ There is a discrepancy between calculations of National Frozen Food Pack Association and the Federal-State Market News Service on United States frozen pack figures before 1961. Since our study concentrates on California and the western region, we have adopted the latter estimates for our report.

b/ Frozen weight, sugar included.

APPENDIX TABLE XIII

Frozen Strawberry Pack: End-of-Month Cold Storage Holdings, United States and Pacific Coast, 1947-1962[a]

	January	February	March	April[b]	May	June	July	August	September	October	November	December
	thousand pounds[c]											
1947												
United States	36,428	31,569	24,141	17,675	54,777	75,388	76,636	69,199	61,491	55,012	48,802	44,17[illegible]
Pacific Coast	7,073	5,579	4,023	2,608	20,347	29,979	22,243	17,855	15,199	12,804	10,427	8,96[illegible]
1948												
United States	38,741	31,626	22,668	15,908	40,761	100,390	106,628	112,757	102,871	97,578	90,106	83,33[illegible]
Pacific Coast	7,934	6,406	4,141	2,745	2,675	53,882	46,134	36,942	31,368	26,658	22,788	18,55[illegible]
1949												
United States	76,495	67,411	53,251	36,370	47,320	80,067	80,438	74,944	68,444	61,976	53,876	46,95[illegible]
Pacific Coast	15,906	13,993	11,904	7,731	11,796	39,797	30,229	25,647	23,254	19,414	16,034	12,58[illegible]
1950												
United States	36,403	28,505	18,102	11,077	45,613	105,785	115,688	120,512	115,535	113,368	107,224	97,69[illegible]
Pacific Coast	8,598	6,008	3,006	1,442	3,266	39,520	40,096	40,322	35,320	32,870	31,112	26,99[illegible]
1951												
United States	86,198	76,340	61,288	49,859	84,816	124,695	132,478	127,638	117,828	112,057	102,734	95,197
Pacific Coast	22,922	19,882	13,931	10,231	11,495	37,913	47,039	45,244	43,079	39,563	34,870	31,445
1952												
United States	85,536	70,645	58,262	41,494	67,459	131,126	139,988	133,346	130,101	123,704	117,234	105,862
Pacific Coast	28,285	21,677	15,527	8,019	11,838	65,643	66,510	60,772	57,860	53,880	49,301	43,622
1953												
United States	97,371	80,719	61,700	45,428	44,423	101,112	143,045	150,991	149,025	144,561	133,605	119,214
Pacific Coast	41,555	31,826	20,134	11,335	10,632	56,472	75,918	69,016	69,208	66,707	60,534	49,427
1954												
United States	105,010	87,400	68,373	51,543	58,511	102,841	144,540	143,586	141,869	133,907	121,575	109,823
Pacific Coast	40,497	30,014	19,289	10,941	14,602	52,343	82,522	71,993	72,421	66,221	57,305	49,240

(Continued on next page.)

Appendix Table XIII continued.

	January	February	March	April[b]	May	June	July	August	September	October	November	December
						thousand pounds[c]						
1955												
United States	95,250	75,807	58,625	40,633	48,914	106,487	163,194	171,858	168,646	162,295	151,883	141,422
Pacific Coast	40,211	25,433	14,264	6,511	15,440	56,391	102,221	98,480	94,132	89,733	80,965	73,852
1956												
United States	125,041	100,510	83,388	64,995	116,060	213,777	242,372	244,161	235,456	223,783	210,302	195,866
Pacific Coast	62,300	42,235	29,509	18,078	38,469	119,236	135,521	130,468	127,310	119,166	109,753	95,658
1957												
United States	179,764	153,664	134,120	102,346	107,358	213,276	222,708	230,206	228,602	212,949	196,345	179,877
Pacific Coast	85,824	64,511	50,000	32,765	33,847	134,085	125,307	130,584	130,337	118,552	110,163	98,515
1958												
United States	154,993	131,807	110,450	84,201	125,945	229,329	228,142	220,592	215,147	197,566	182,509	167,651
Pacific Coast	81,913	65,059	48,075	30,679	52,067	136,803	134,226	128,317	124,304	113,706	105,011	92,425
1959												
United States	151,847	128,362	110,868	88,659	93,761	191,404	223,381	226,023	207,993	195,668	181,760	165,547
Pacific Coast	83,493	65,563	53,082	39,271	35,033	126,337	146,480	147,312	136,982	127,286	117,811	105,945
1960												
United States	148,423	124,617	103,643	84,648	90,487	173,756	206,069	204,800	203,531	190,386	174,100	161,119
Pacific Coast	93,149	74,566	57,561	42,649	36,083	111,641	126,600	125,000	124,502	115,331	102,373	92,104
1961												
United States	146,081	124,332	101,468	89,486	99,110	195,084	217,417	213,695	194,419	183,382	167,499	151,907
Pacific Coast	82,603	65,862	46,053	31,306	26,756	123,537	131,448	128,819	116,674	110,461	98,863	87,906
1962												
United States	132,373	113,732	93,976	76,571	81,378	157,359	202,155	200,023	204,657	189,546	174,017	159,051
Pacific Coast	74,694	61,161	43,269	26,098	30,874	101,285	135,334	131,635	136,413	123,545	112,518	99,203

a/ Pacific Coast includes California, Washington, and Oregon.

b/ End of April is considered end of season.

c/ Frozen weight, sugar included.